



STIC Search Report

Biotech-Chem Library

STIC Database Tracking Number: 133400

TO: Shailendra Kumar
Location: 5c03 / 5c18
Wednesday, September 29, 2004
Art Unit: 1621
Phone: 272-0640
Serial Number: 10 / 652104

From: Jan Delaval
Location: Biotech-Chem Library
Rem 1A51
Phone: 272-2504

jan.delaval@uspto.gov

Search Notes

Scientific and Technical Information Center

Requester's Full Name: S. Kumar Examiner #: 69594 Date: 9/23/04
Art Unit: 1621 Phone Number 202-6540 Serial Number: 101687104
Mail Box and Bldg/Room Location: REIN 5C03 Results Format Preferred (circle): PAPER DISK E-MAIL
5C18

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Synthesis of N-vinylformamide

Inventors (please provide full names): Eric J. Beckman et al.

Earliest Priority Filing Date: 8/30/2002

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Atty. Docket No.: 02-027
Express Mail Label No. EL903258266US

WHAT IS CLAIMED IS:

1. A process to produce N-vinylformamide including the steps of: reacting hydroxyethyl formamide with a reactant including at least one cyclic anhydride group to form an ester, and dissociating the ester to synthesize N-vinylformamide and a compound including at least one diacid group.
2. The process of Claim 1 wherein the reactant including at least one cyclic anhydride group is succinic anhydride, maleic anhydride, phthalic anhydride, a polymer including at least one cyclic anhydride group, or a solid support to which at least one cyclic anhydride group is covalently tethered.
3. A process of claim 1 wherein the cyclic anhydride is regenerated from a diacid formed in the synthesis of the ester by dehydrating the diacid.
4. The process of claim 1 where NVF is used as a solvent.
5. The process of claim 1 where toluene or acetaldehyde is used as a solvent.
6. The process of claim 2 wherein a polymer including at least one cyclic anhydride group is used.
7. The process of claim 6 further including the step of regenerating the polymer including at least one cyclic anhydride group by heating the polymeric material containing at least one diacid group to a temperature sufficiently high to dehydrate diacid groups.
8. The process of claim 7 wherein the temperature used to dehydrate diacid groups is higher than a temperature used to dissociate the ester by heat.
9. The process of claim 6 where NVF is used as a solvent.
10. The process of claim 6 where toluene or acetaldehyde is used as a solvent.

Qar
9/29/04

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(FILE 'HOME' ENTERED AT 06:02:47 ON 29 SEP 2004)
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 06:03:08 ON 29 SEP 2004
 L1 1 S US20040186319/PN OR (US2003-652104# OR WO2003-US27084 OR US20
 E BECKMAN E/AU
 L2 257 S E3,E6,E12-E18
 E CHAPMAN T/AU
 L3 69 S E3,E12,E47,E48
 E FAVERO C/AU
 L4 7 S E3,E5-E7
 E CAPELLI C/AU
 L5 27 S E3,E5,E6
 E SWIFT H/AU
 L6 185 S E3,E7,E12-E15

FILE 'REGISTRY' ENTERED AT 06:05:42 ON 29 SEP 2004
 L7 1 S 13162-05-5
 L8 523 S 13162-05-5/CRN
 L9 4 S L8 NOT (MXS OR IDS OR PMS)/CI
 L10 3 S L9 NOT CONJUGATE
 L11 4 S L7,L10

FILE 'HCAPLUS' ENTERED AT 06:07:11 ON 29 SEP 2004
 L12 189 S L11
 L13 778 S N() (VINYLFORMAMIDE OR ETHENYLFORMAMIDE OR (VINYL OR ETHENYL) (
 L14 804 S L12,L13
 L15 5 S L2-L6 AND L14
 SEL RN L1

FILE 'REGISTRY' ENTERED AT 06:09:04 ON 29 SEP 2004
 L16 13 S E1-E13
 L17 12 S L16 NOT L11

FILE 'HCAPLUS' ENTERED AT 06:18:27 ON 29 SEP 2004
 L18 68 S HYDROXYETHYLFORMAMIDE OR (HYDROXYETHYL OR HYDROXY ETHYL) () FOR
 L19 5 S FORMYLAMINOETHANOL OR FORMYL().(AMINOETHANOL OR AMINO ETHANOL)

FILE 'REGISTRY' ENTERED AT 06:21:01 ON 29 SEP 2004
 L20 1 S 693-06-1
 L21 1 S 102904-85-8
 L22 2 S L20,L21
 SEL RN
 L23 8 S E14-E15/CRN
 L24 3 S (SUCCINIC ANHYDRIDE OR MALEIC ANHYDRIDE OR PHTHALIC ANHYDRIDE
 L25 3 S 9011-16-9 OR 145314-10-9 OR 9011-13-6
 L26 23203 S 108-31-6/CRN
 L27 381 S L26 AND 107-25-5/CRN
 L28 1 S L27 AND 124-18-5/CRN
 L29 380 S L27 NOT L28
 L30 5 S L29 AND 2/NC
 L31 375 S L29 NOT L30
 L32 88 S L31 AND SALT
 L33 79 S L32 AND 1/NR
 L34 169 S L31 AND 1/NR NOT L32
 L35 5554 S L26 AND 100-42-5/CRN
 L36 1869 S L35 AND 2/NR
 L37 29 S L36 AND 2/NC
 L38 15 S L37 AND GRS/CI
 L39 14 S L37 NOT L38
 L40 301 S L36 AND SALT

L41 1 S 75-07-0
 L42 1 S 75-12-7
 L43 1 S 7631-86-9
 L44 1 S TOLUENE/CN

FILE 'HCAPLUS' ENTERED AT 06:36:58 ON 29 SEP 2004

L45 112 S L22
 L46 14 S L14 AND L18,L19,L45
 L47 10 S L14 AND L24
 L48 3 S L14 AND L25,L28,L30,L39
 L49 2 S L14 AND CYCLIC(L) ANHYDRIDE
 E ANHYDRIDE/CT
 L50 0 S L14 AND E40
 L51 2 S L14 AND E37,E59-E67
 E E37+ALL
 L52 16 S L14 AND E2+NT
 L53 32 S L14 AND (L41 OR ACETALDEHYDE)
 L54 9 S L14 AND (L44 OR TOLUENE)
 L55 155 S L14 AND (L42 OR FORMAMIDE)
 L56 21 S L14 AND L43
 L57 30 S L55 AND L53,L54
 L58 12 S L46 AND L47-L49,L51-L54,L56,L57
 L59 14 S L46,L58
 L60 81 S L12 (L) PREP+NT/RL
 L61 81 S L11/P
 L62 472 S L14 (L) (PREP? OR SYNTHES? OR MANUFACT? OR PRODUC?)
 L63 11 S L60,L61 AND L59
 L64 45 S L60,L61 AND L46-L58
 L65 18 S L1,L15,L59,L63
 L66 11 S L64 AND L65
 L67 18 S L65,L66
 L68 69 S L64,L60,L61 NOT L67
 L69 18 S L68 AND VINYLFORMAMIDE/TI
 L70 51 S L68 NOT L69
 L71 17 S L70 AND (FLUIDIZED BED OR AMINE FUNCTIONAL OR CONTIN? DISTILL
 SEL DN AN 2 4 5 9 16
 L72 5 S L71 AND E1-E15
 SEL DN AN L69 11
 L73 1 S L69 AND E16-E18
 SEL DN AN L67 3 9 11 12 13 16 18
 L74 7 S L67 AND E19-E39
 L75 17 S L72-L74,L15
 L76 7 S L46 NOT L75
 L77 25 S L60,L61 AND L47-L54,L56-L59
 L78 11 S L77 NOT L75,L76
 L79 17 S L75 AND L1-L6,L12-L15,L18,L19,L45-L78
 SEL RN

FILE 'REGISTRY' ENTERED AT 07:14:57 ON 29 SEP 2004

L80 94 S E40-E133
 L81 10 S L80 AND L7-L11
 L82 13 S L80 AND L16,L17
 L83 11 S L80 AND L20-L44
 L84 4 S L81 NOT PMS/CI
 L85 2 S L81 AND 1/NC
 L86 3 S L84 NOT COMPD
 L87 4 S L85,L86
 L88 11 S L82 NOT S/ELS
 L89 9 S L83 NOT C3H5NO
 L90 71 S L80 NOT L81-L83
 L91 15 S L87,L88,L89

FILE 'HCAPLUS' ENTERED AT 07:19:22 ON 29 SEP 2004

L92 16 S L91 AND L79
 L93 1 S L79 NOT L92

=> fil hcaplus
 FILE 'HCAPLUS' ENTERED AT 07:20:00 ON 29 SEP 2004
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FILE COVERS 1907 - 29 Sep 2004 VOL 141 ISS 14
 FILE LAST UPDATED: 28 Sep 2004 (20040928/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

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L92 ANSWER 1 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 2004:220302 HCAPLUS
 DN 140:254056
 ED Entered STN: 19 Mar 2004
 TI N-vinylformamide derivatives, (co)polymers, and their synthesis
 IN Beckman, Eric J.; Chapman, Toby M.; Shi, Lianjun
 PA University of Pittsburgh, USA
 SO PCT Int. Appl., 38 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C07C231-00
 CC 35-2 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 23, 46

FAN.CNT 1	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004022524	A2	20040318	WO 2003-US27732	20030905
	WO 2004022524	A3	20040506		
	WO 2004022524	C2	20040624		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2004167338	A1	20040826	US 2003-656706	20030905
PRAI	US 2002-408730P	P	20020906		

US 2003-484948P P 20030703

CLASS

PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

WO 2004022524 ICM C07C231-00

OS MARPAT 140:254056

AB A method of **synthesizing** a vinylformamide compound H₂C:CHN(RR₁)COH, comprises the step of reacting a **N-vinylformamide** salt H₂C:CHN(M)COH, with XRR₁; where X = Br, Cl or I, M = alkali metal or an alkali earth metal, R₁ = C₀₋₂₅ alkylene group, a C₀₋₂₅ fluoroalkylene group or a C₀₋₂₅ perfluoro alkylene group, R = H, provided R₁ is not absent, alkyl, fluoroalkyl, perfluoroalkyl, aryl, OH, a polyether group, a heterocyclic group of 5 or 6 atoms where ≥1 of the atoms is not a C and is N, O, or S, OR₃, where R₃ = alkyl, fluoroalkyl, perfluoroalkyl, or aryl, C(O)R₄, C(O)OR₄, OC(O)R₄, where R₄ = H, alkyl, fluoroalkyl, perfluoroalkyl, or aryl, a phthalimide group or NR₅R₅ where R₅ and R₅ = H, C(O)R₄, alkyl, fluoroalkyl, perfluoroalkyl or aryl group. **N-hexyl-N-vinylformamide (prepn)** described, 1.0 g) and initiator AIBN (18 mg) were polymerized in an oil bath at a constant temperature 65° 15 h, the polymer (8.3 + 10⁻³ g/mol) obtained was purified with petroleum ether and dried under reduced pressure at 600° for 12 h.

ST alkyl vinylformamide deriv manuf polymn

IT Amphiphiles

(**N-vinylformamide** copolymer with emulsion stabilizing property)

IT 671224-51-4P 671224-52-5DP, hydrolyzed 671224-52-5P 671224-53-6P
671224-54-7DP, hydrolyzed 671224-54-7P 671224-60-5DP, reaction

products with polyvinylamine

RL: IMF (Industrial manufacture); PREP (Preparation)
(alkyl **N-vinylformamide** derivs. and their polymer products, some with surfactant properties)

IT 671224-60-5P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(alkyl **N-vinylformamide** derivs. and their polymer products, some with surfactant properties)

IT 109-65-9, 1-Bromobutane 111-25-1, 1-Bromohexane 112-29-8,

1-Bromodecane 143-15-7, 1-Bromododecane 335-64-8,

Pentadecafluorooctanoyl chloride 574-98-1 5292-43-3 **13162-05-5**

, **N-Vinylformamide**

RL: RCT (Reactant); RACT (Reactant or reagent)
(alkyl **N-vinylformamide** derivs. and their polymer products, some with surfactant properties)

IT 671224-56-9P 671224-58-1P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(preparation and hydrolysis; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

IT 192058-10-9P 671224-48-9P 671224-49-0P 671224-50-3P 671224-55-8P

671224-57-0P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(preparation and polymerization; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

IT 671224-46-7P 671224-61-6P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP

(Preparation); RACT (Reactant or reagent)

(reaction with alkylbromide; alkyl **N-vinylformamide** derivs. and their polymer **products**, some with surfactant properties)

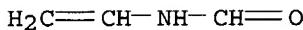
IT 6066-82-6, N-Hydroxysuccinimide
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (reaction with pentadecafluoroctanoyl chloride; alkyl N-vinylformamide derivs. and their polymer products, some with surfactant properties)

IT 26336-38-9DP, Poly(vinylamine), reaction products with perfluoroalkyl compound
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
 (reduction; alkyl N-vinylformamide derivs. and their polymer products, some with surfactant properties)

IT 671224-59-2P
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (surfactant; alkyl N-vinylformamide derivs. and their polymer products, some with surfactant properties)

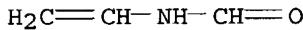
IT 13162-05-5, N-Vinylformamide
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (alkyl N-vinylformamide derivs. and their polymer products, some with surfactant properties)

RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



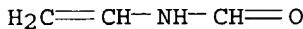
IT 671224-46-7P 671224-61-6P
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
 (reaction with alkylbromide; alkyl N-vinylformamide derivs. and their polymer products, some with surfactant properties)

RN 671224-46-7 HCPLUS
 CN Formamide, N-ethenyl-, potassium salt (9CI) (CA INDEX NAME)



● K

RN 671224-61-6 HCPLUS
 CN Formamide, N-ethenyl-, sodium salt (9CI) (CA INDEX NAME)



● Na

L92 ANSWER 2 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 2004:219688 HCPLUS
 DN 140:255203
 ED Entered STN: 19 Mar 2004
 TI Compositions of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength
 IN Beckman, Eric J.; Carroll, W. Eamon; Chapman, Toby; Minnich,

Kristen E.; Sagl, Dennis; Goddard, Richard J.

PA USA
 SO U.S. Pat. Appl. Publ., 12 pp.
 CODEN: USXXCO
 DT Patent
 LA English
 IC ICM D21H017-55
 ICS D21H017-24
 NCL 162158000; 162164600; 162175000; 162164300; 527300000
 CC 43-7 (Cellulose, Lignin, Paper, and Other Wood Products)
 Section cross-reference(s) : 38

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004050513	A1	20040318	US 2002-252262	20020923
	WO 2004025027	A1	20040325	WO 2003-US28704	20030912
	WO 2004025027	C2	20040624		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
PRAI	US 2002-410375P	P	20020913		
	US 2002-252262	A	20020923		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004050513	ICM	D21H017-55
	ICS	D21H017-24
	NCL	162158000; 162164600; 162175000; 162164300; 527300000

AB A composition comprises at least one hydrophilic polymer containing at least

two groups which are independently the same or different primary amine group or secondary amine group and at least one saccharide containing a reducible function. The polymer is selected from partially hydrolyzed poly(**N-vinylformamide**), partially hydrolyzed vinyl acetate-**N-vinylformamide** copolymer, hydrolyzed acrylonitrile-**N-vinylformamide** copolymer, amine-functional polyacrylamide, acrylic acid-vinylamine copolymer, maleic anhydride/maleic acid copolymers with **N-vinylformamide/vinylamine**, **N-vinylformamide/vinylamine** copolymers with vinyl sulfonate monomers, allylamine polymer, diallylamine polymer, allylamine-diallylamine copolymer, urea-formaldehyde copolymer, melamine-formaldehyde copolymer, amidoamine polymers, amine-epichlorohydrin polymers, polyethylenimine, hydrolyzed or partially hydrolyzed poly(2-alkyl-2-oxazoline). The compns. form stable hydrogels that can be used in papermaking to increase paper strength. Thus, vinyl alc.-vinylamine copolymer containing 12% of amine groups (2.5) and D-glucose (7.5 g) were dissolved in distilled water (25 mL) and refluxed with constant stirring under argon. A strong, bright yellow gel appeared at 90° and swelled when exposed to excess water and to 1M HCl.

ST amine group hydrophilic polymer reducible saccharide compn hydrogel; paper strength increase amine hydrophilic polymer reducible saccharide compn

IT Amines, uses

RL: TEM (Technical or engineered material use); USES (Uses)
 (amido, polymers; compns. of amine-containing hydrophilic polymers and
 reducible saccharides for increasing paper strength)

IT Hydrogels
 Paper
 (compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT Aminoplasts
 Disaccharides
 Monosaccharides
 Polysaccharides, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT Polyamines
 RL: TEM (Technical or engineered material use); USES (Uses)
 (epoxy; compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT Epoxy resins, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (polyamine-; compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT Polyamines
 RL: TEM (Technical or engineered material use); USES (Uses)
 (polyethylene-, N-acyl; compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT Polyamines
 RL: TEM (Technical or engineered material use); USES (Uses)
 (polyethylene-; compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT Amines, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (polymers; compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT 72018-12-3DP, Poly(N-vinylformamide),
 hydrolyzed
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

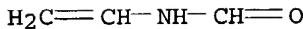
IT 50-99-7, Glucose, uses 63-42-3, Lactose 533-67-5, 2-Deoxy-D-ribose 9002-98-6 9003-05-8D, Polyacrylamide, amine group-containing 9003-08-1, Formaldehyde-melamine copolymer 9011-05-6, Formaldehyde-urea copolymer 24259-59-4, L-Ribose 26913-06-4, Poly[imino(1,2-ethanediyl)] 29499-22-7, Vinyl alcohol-vinyl amine copolymer 30551-89-4, Allylamine homopolymer 30916-76-8, Acrylic acid-vinylamine copolymer 62238-80-6, Diallylamine homopolymer 108941-57-7D, Vinyl acetate-N-vinylformamide copolymer, hydrolyzed 114815-82-6D, Acrylonitrile-N-vinylformamide copolymer, hydrolyzed 117413-06-6, Allylamine-diallylamine copolymer
 RL: TEM (Technical or engineered material use); USES (Uses)
 (compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

IT 72018-12-3DP, Poly(N-vinylformamide),
 hydrolyzed
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
 (compns. of amine-containing hydrophilic polymers and reducible saccharides for increasing paper strength)

RN 72018-12-3 HCAPLUS
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 13162-05-5
 CMF C3 H5 N O



L92 ANSWER 3 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 2004:203798 HCAPLUS
 DN 140:237535
 ED Entered STN: 14 Mar 2004
 TI Synthesis of N-vinylformamide
 IN Beckman, Eric J.; Chapman, Toby M.; Favero,
 Cedrick Gilbert; Capelli, Christopher C.; Swift,
 Harold E.
 PA University of Pittsburgh, USA; SNF SA
 SO PCT Int. Appl., 27 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C07C231-12
 ICS C07C233-03; C07F007-18
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
 Section cross-reference(s): 23, 35

FAN.CNT 1	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2004020395	A1	20040311	WO 2003-US27084		20030829 <--
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	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
PRAI US 2004186319	A1	20040923	US 2003-652104		20030829 <--
PRAI US 2002-407077P	P	20020830	<--		

CLASS	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2004020395	ICM	C07C231-12	
	ICS	C07C233-03; C07F007-18	

OS CASREACT 140:237535
 AB A process to produce N-vinylformamide
 includes the steps of reacting hydroxyethylformamide with a
 reactant including at least one cyclic anhydride group
 to form an ester, and dissociating (or cracking) the ester to
 synthesize N-vinylformamide and a compound
 including at least one diacid group. The ester can be dissociated using
 heat. The reactant including at least one cyclic
 anhydride group can, for example, be succinic anhydride,
 maleic anhydride, phthalic anhydride, a polymer
 including at least one cyclic anhydride group, or a
 solid support to which at least one cyclic anhydride
 group is covalently tethered. Preferably, the cyclic
 anhydride is regenerated from the diacid formed in the
 synthesis of the ester by heating the diacid to dehydrate the
 diacid. The temperature required to dehydrate diacid groups is preferably
 higher than the temperature used to dissociate the ester. A 1-pot method
 involves

mixing AcH, formamide, and a source of **anhydride**, dissociating an ester formed by the reaction of the **anhydride** source and **hydroxyethylformamide** formed in the reaction vessel to form **N-vinylformamide** and a compound having ≥ 1 diacid group.

ST vinylformamide manuf **hydroxyethylformamide** ester dissociation; acid anhydride **hydroxyethylformamide** reaction; **formamide** **acetaldehyde** acid anhydride reaction

IT Silica gel, preparation
 RL: IMF (Industrial manufacture); PREP (Preparation)
 (reaction products, with [[[trimethoxysilyl)propyl]thio]propyl]dihydrofuranone; synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT Condensation reaction
 (synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT Esters, preparation
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
 (synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT Anhydrides
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT 4420-74-0, 3-Mercaptopropyltriethoxysilane
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (anhydride precursor; synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT 75-07-0, Acetaldehyde, reactions 75-12-7,
 Formamide, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (hydroxyethylformamide precursor; synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT 13162-05-5P, N-Vinylformamide 667454-53-7DP,
 reaction products with silica gel 667454-53-7P
 RL: IMF (Industrial manufacture); PREP (Preparation)
 (synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

IT 85-44-9, Phthalic anhydride 108-24-7, Acetic anhydride 108-31-6, Maleic anhydride, reactions 7539-12-0, Allylsuccinic anhydride 7631-86-9D, Silica, acid anhydride derivs. 9011-13-6, Maleic anhydride-styrene copolymer 9011-16-9, Maleic anhydride-methyl vinyl ether copolymer 145314-10-9, Decadiene-maleic anhydride-methyl vinyl ether copolymer
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (synthesis of **N-vinylformamide** by reaction of monomeric or polymeric acid anhydrides with **hydroxyethylformamide** and dissociation of ester products)

RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Air Prod & Chem; DE 4116266 A 1992 HCPLUS

(2) Anon; PATENT ABSTRACTS OF JAPAN 1986, V010(276), PC-373

(3) Basf Ag; DE 4438366 A 1996 HCPLUS

(4) Fuji Photo Film Co Ltd; EP 0361514 A 1990 HCPLUS

(5) Fuji Photo Film Co Ltd; EP 0362804 A 1990 HCPLUS

(6) Fuji Photo Film Co Ltd; EP 0440226 A 1991 HCPLUS

(7) Mitsubishi Chem Ind; FR 2558156 A 1985 HCPLUS

(8) Mitsubishi Chem Ind Ltd; JP 61097309 A 1986 HCPLUS

(9) Mitsubishi Kasei Corp; JP 03182946 B 2001

(10) Mitsubishi Kasei Corp; JP 03314417 B 2002

(11) Mitsubishi Kasei Corp; JP 03319007 B 2002

IT 75-07-0, Acetaldehyde, reactions 75-12-7,

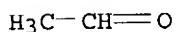
Formamide, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(hydroxyethylformamide precursor; synthesis of
N-vinylformamide by reaction of monomeric or
polymeric acid anhydrides with hydroxyethylformamide and
dissociation of ester products)

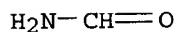
RN 75-07-0 HCPLUS

CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)



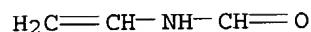
IT 13162-05-5P, N-Vinylformamide

RL: IMF (Industrial manufacture); PREP (Preparation)

(synthesis of N-vinylformamide by
reaction of monomeric or polymeric acid anhydrides with
hydroxyethylformamide and dissociation of ester products)

RN 13162-05-5 HCPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



IT 85-44-9, Phthalic anhydride 108-24-7, Acetic anhydride

108-31-6, Maleic anhydride, reactions 7539-12-0,

Allylsuccinic anhydride 7631-86-9D, Silica, acid anhydride

derivs. 9011-13-6, Maleic anhydride-styrene copolymer

9011-16-9, Maleic anhydride-methyl vinyl ether copolymer

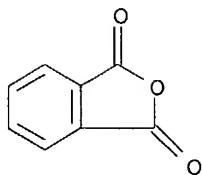
145314-10-9, Decadiene-maleic anhydride-methyl vinyl ether
copolymer

RL: RCT (Reactant); RACT (Reactant or reagent)

(synthesis of N-vinylformamide by
reaction of monomeric or polymeric acid anhydrides with
hydroxyethylformamide and dissociation of ester products)

RN 85-44-9 HCPLUS

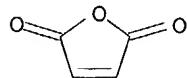
CN 1,3-Isobenzofurandione (9CI) (CA INDEX NAME)



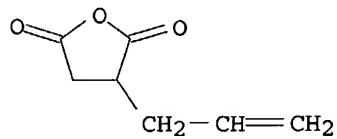
RN 108-24-7 HCAPLUS
 CN Acetic acid, anhydride (9CI) (CA INDEX NAME)

Ac—O—Ac

RN 108-31-6 HCAPLUS
 CN 2,5-Furandione (9CI) (CA INDEX NAME)



RN 7539-12-0 HCAPLUS
 CN 2,5-Furandione, dihydro-3-(2-propenyl)- (9CI) (CA INDEX NAME)



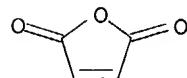
RN 7631-86-9 HCAPLUS
 CN Silica (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

O—Si=O

RN 9011-13-6 HCAPLUS
 CN 2,5-Furandione, polymer with ethenylbenzene (9CI) (CA INDEX NAME)

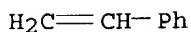
CM 1

CRN 108-31-6
 CMF C₄ H₂ O₃



CM 2

CRN 100-42-5
 CMF C₈ H₈



RN 9011-16-9 HCPLUS
 CN 2,5-Furandione, polymer with methoxyethene (9CI) (CA INDEX NAME)

CM 1

CRN 108-31-6
 CMF C4 H2 O3



CM 2

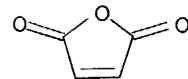
CRN 107-25-5
 CMF C3 H6 O



RN 145314-10-9 HCPLUS
 CN 2,5-Furandione, polymer with decadiene and methoxyethene (9CI) (CA INDEX NAME)

CM 1

CRN 108-31-6
 CMF C4 H2 O3



CM 2

CRN 107-25-5
 CMF C3 H6 O



CM 3

CRN 147730-40-3
 CMF C10 H18
 CCI IDS

CM 4

CRN 124-18-5

CMF C10 H22

Me—(CH₂)₈—Me

L92 ANSWER 4 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 2000:780900 HCAPLUS
 DN 133:322291
 ED Entered STN: 07 Nov 2000
 TI Continuous distillation of heat-unstable monomers
 IN Dupuis, Jacques; Winter, Manfred; Kroner, Michael
 PA BASF A.-G., Japan
 SO Jpn. Kokai Tokkyo Koho, 5 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C07C231-24
 ICS C07C233-03; C07D207-267
 CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	-----
PI	JP 2000309568	A2	20001107	JP 1999-122767	19990428
PRAI	JP 1999-122767			19990428	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2000309568	ICM	C07C231-24
	ICS	C07C233-03; C07D207-267

AB The monomers are distilled by sep. supplying the monomers and **formamide** into the bottom of the column as liquid, evaporation of **formamide** in the bottom of the column with an evaporator, discharging **formamide** with components having higher b.p. than the monomers from the bottom of the column, adding fresh **formamide**, removal of the monomers from discharging parts at one three height from the top of the column with control to have the monomer ≤5% **formamide**, and removal of components having lower b.p. than the monomers at the top of the column. **N-vinylformamide** containing 31% formylalanenitrile and **formamide** were sep. fed into a distillation column and distilled to give **N-vinylformamide** containing **formamide** 0.08 weight% with >99% purity.

ST vinyl monomer distn **formamide**; vinylformamide distn **formamide**

IT Distillation
 (distillation of heat-unstable monomers with **formamide**)

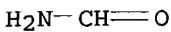
IT 75-12-7, **Formamide**, uses
 RL: NUU (Other use, unclassified); USES (Uses)
 (distillation of heat-unstable monomers with **formamide**)

IT 88-12-0P, preparation 13162-05-5P, N-
Vinylformamide
 RL: PUR (Purification or recovery); PREP (Preparation)
 (distillation of heat-unstable monomers with **formamide**)

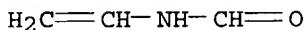
IT 75-12-7, **Formamide**, uses
 RL: NUU (Other use, unclassified); USES (Uses)
 (distillation of heat-unstable monomers with **formamide**)

RN 75-12-7 HCAPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)



IT 13162-05-5P, N-Vinylformamide
 RL: PUR (Purification or recovery); PREP (Preparation)
 (distillation of heat-unstable monomers with formamide)
 RN 13162-05-5 HCAPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 5 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:582561 HCAPLUS

DN 131:200255

ED Entered STN: 16 Sep 1999

TI Continuous distillation of thermolabile monomers

IN Winter, Manfred; Dupuis, Jacques; Kroner, Michael

PA BASF A.-G., Germany

SO U.S., 4 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM B01D003-10

ICS B01D003-34; B01D003-42; C07D233-000

NCL 203001000

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
PI US 5951828	A	19990914	US 1997-816729	19970314
PRAI DE 1996-19618855		19960510		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
-----	-----	-----
US 5951828	ICM	B01D003-10
	ICS	B01D003-34; B01D003-42; C07D233-000
	NCL	203001000

AB In a process for the continuous distillation of thermolabile monomers, especially

N-vinylcarboxamides under reduced pressure in the presence of H₂NCHO in a column, the monomers are continuously fed in liquid form, sep. from H₂NCHO, into the lower part of the column up to the middle of the column, H₂NCHO is vaporized with a vaporizer at the bottom of the column and, together with constituents having higher b.p. than the thermolabile monomers, is discharged from the bottom of the column and replaced by addition of fresh H₂NCHO. The thermolabile monomers are taken off at a side off-take in the upper 3d of the column, with the distillation being controlled such that the monomers contain <5% of H₂NCHO, and a product stream containing constituents which have a lower b.p. than the thermolabile monomers is taken off at the top of the column. Thus, distillation of N-vinylformamide (I) containing 31% formylalanine nitrile in the presence of H₂NCHO gave >99% pure I.

ST vinylcarboxamide monomer purifn continuous distn formamide; formylalanine nitrile removal vinylformamide purifn continuous distn formamide

IT Monomers

RL: PUR (Purification or recovery); PREP (Preparation)
 (continuous distillation of thermolabile monomers in presence of formamide)

IT Distillation
 (continuous; continuous distillation of thermolabile monomers in presence of formamide)

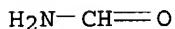
IT 75-12-7, Formamide, uses
 RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (continuous distillation of thermolabile monomers in presence of)
 IT 88-12-0P, N-Vinyl-2-pyrrolidone, preparation 13162-05-5P,
N-Vinylformamide
 RL: PUR (Purification or recovery); PREP (Preparation)
 (continuous distillation of thermolabile monomers in presence of formamide)
 IT 27394-99-6, 2-(Formylamino)propionitrile
 RL: REM (Removal or disposal); PROC (Process)
 (continuous distillation of thermolabile monomers in presence of formamide)

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD

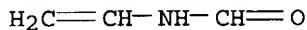
RE
 (1) Aigner; US 4990222 1991 HCPLUS
 (2) Anon; RU 570371 1977
 (3) Anon; JP 61-289069 1986 HCPLUS
 (4) Anon; JP 05230155 1993 HCPLUS
 (5) Bannon; US 4308131 1981 HCPLUS
 (6) Giroux; US 4230533 1980 HCPLUS
 (7) Jensen; US 4348259 1982 HCPLUS
 (8) Kroener; US 4814505 1989 HCPLUS

IT 75-12-7, Formamide, uses
 RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (continuous distillation of thermolabile monomers in presence of)

RN 75-12-7 HCPLUS
 CN Formamide (8CI, 9CI) (CA INDEX NAME)



IT 13162-05-5P, N-Vinylformamide
 RL: PUR (Purification or recovery); PREP (Preparation)
 (continuous distillation of thermolabile monomers in presence of formamide)
 RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 6 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN

AN 1998:25390 HCPLUS

DN 128:61273

ED Entered STN: 16 Jan 1998

TI Preservation and purification of N-vinylcarboxamides

IN Sato, Shinichi; Oshita, Takahiro; Izumikawa, Hiroshi

PA Mitsubishi Chemical Industries Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C233-03

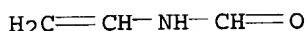
ICS C07C231-22; C07C231-24; C07C233-05

CC 23-18 (Aliphatic Compounds)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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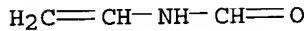
PI	JP 10001462	A2	19980106	JP 1996-154558	19960614
PRAI	JP 1996-154558			19960614	
CLASS					
	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES		
	-----	-----	-----		
JP	10001462	ICM	C07C233-03		
		ICS	C07C231-22; C07C231-24; C07C233-05		
OS	MARPAT 128:61273				
AB	N-vinylcarboxamides are preserved in the presence of alcs. with alc. OH content ≥12 weight% as stabilizers. Solns. containing the amides and 1-500 weight% (based on the amides) of the alcs. are subjected to continuous distillation for purification. Crude N-vinylformamide was heated with 10 weight% 1,4-butanediol at 110° for 4 h to show 14.7% decomposition, 10.2% dimer formation, and trace amount of insol. polymer formation.				
ST	vinylcarboxamide preservation purifn alc stabilizer; polymn inhibitor butanediol vinylformamide; distn purifn preservation purifn alc stabilizer				
IT	Alcohols, uses Glycols, uses RL: MOA (Modifier or additive use); USES (Uses) (C2-8; preservation and purification of N-vinylcarboxamides in presence of alcs.)				
IT	Amides, preparation RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process) (N-vinyl; preservation and purification of N-vinylcarboxamides in presence of alcs.)				
IT	Distillation Heat stabilizers Polymerization inhibitors (preservation and purification of N-vinylcarboxamides in presence of alcs.)				
IT	56-81-5, Glycerin, uses 100-51-6, Benzyl alcohol, uses 107-21-1, Ethylene glycol, uses 110-63-4, 1,4-Butanediol, uses 111-46-6, Diethylene glycol, uses 112-27-6, Triethylene glycol 25265-75-2, Butanediol RL: MOA (Modifier or additive use); USES (Uses) (preservation and purification of N-vinylcarboxamides in presence of alcs.)				
IT	13162-05-5P, N-Vinylformamide RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process) (preservation and purification of N-vinylcarboxamides in presence of alcs.)				
IT	13162-05-5P, N-Vinylformamide RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process) (preservation and purification of N-vinylcarboxamides in presence of alcs.)				
RN	13162-05-5 HCPLUS				
CN	Formamide, N-ethenyl- (9CI) (CA INDEX NAME)				



L92 ANSWER 7 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1997:508137 HCPLUS
 DN 127:191280
 ED Entered STN: 11 Aug 1997
 TI Determination of Mark-Houwink parameters for poly(**N-vinylformamide**)
 AU Singley, E. J.; Daniel, A.; Person, D.; Beckman, E. J.
 CS Chemical Engineering Department, University Pittsburgh, Pittsburgh, PA,
 15261, USA

SO Journal of Polymer Science, Part A: Polymer Chemistry (1997), 35(12),
 2533-2534
 CODEN: JPACEC; ISSN: 0887-624X
 PB Wiley
 DT Journal
 LA English
 CC 36-5 (Physical Properties of Synthetic High Polymers)
 AB The Mark-Houwink parameters for poly(**N-vinylformamide**)
 are determined
 ST polyvinylformamide Mark Houwink parameter; viscosity mol wt
 polyvinylformamide
 IT Molecular weight
 Viscosity
 (determination of Mark-Houwink parameters for poly(**N-**
 vinylformamide))
 IT Polymer chains
 (length; determination of Mark-Houwink parameters for poly(**N-**
 vinylformamide))
 IT 72018-12-3, Poly(**N-vinylformamide**)
 RL: PRP (Properties)
 (determination of Mark-Houwink parameters for poly(**N-**
 vinylformamide))
 IT 72018-12-3, Poly(**N-vinylformamide**)
 RL: PRP (Properties)
 (determination of Mark-Houwink parameters for poly(**N-**
 vinylformamide))
 RN 72018-12-3 HCPLUS
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 13162-05-5
CMF C3 H5 N O

L92 ANSWER 8 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1996:382753 HCPLUS
 DN 125:57923
 ED Entered STN: 03 Jul 1996
 TI Process for the preparation of **N-alkenyl**
 carboxylic amides
 IN Heider, Marc; Ruehl, Thomas; Henkelmann, Jochem
 PA BASF A.-G., Germany
 SO Eur. Pat. Appl., 8 pp.
 CODEN: EPXXDW
 DT Patent
 LA German
 IC ICM C07C231-08
 ICS C07C233-03
 CC 23-18 (Aliphatic Compounds)
 Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 709367	A1	19960501	EP 1995-116459	19951019
	EP 709367	B1	19970827		
	R: BE, DE, FR, GB, NL				
	DE 4438366	A1	19960502	DE 1994-4438366	19941027
	US 5710331	A	19980120	US 1995-548724	19951026

JP 08208575 A2 19960813 JP 1995-280758 19951027
 PRAI DE 1994-4438366 19941027

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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EP 709367	ICM	C07C231-08
	ICS	C07C233-03

OS CASREACT 125:57923; MARPAT 125:57923
 AB The preparation of title compds. R1CONHCR2:CR3R4 (R1-R4 = H, aliphatic, cycloaliph., aromatic group) via the reaction of R1CONH2 with R2COCHR3R4 in the presence of a base and carbonyl compound R5COX (R5 = H, alkyl, aryl, X = halo, alkoxy, carboxyl) is described. Thus, reaction of **formamide** with **acetaldehyde** in the presence of Et₃N and Me formate gave 76% **N-vinylformamide**.

ST alkenyl carboxylic amide prepn

IT Amides, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)
 (alkenyl, preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 107-31-3, Methyl formate 108-05-4, Acetic acid ethenyl ester, uses 121-44-8, uses 497-19-8, Sodium carbonate, uses

RL: NUU (Other use, unclassified); USES (Uses)
 (preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 55-21-0, Benzamide 60-35-5, Acetamide, reactions 75-07-0,

Acetaldehyde, reactions 75-12-7, **Formamide**, reactions 123-38-6, Propanal, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
 (preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

IT 5202-78-8P 13162-05-5P, **N-Vinylformamide**

13313-25-2P, N-Vinylbenzamide 178058-71-4P, N-Propenylformamide

RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

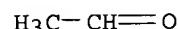
IT 75-07-0, **Acetaldehyde**, reactions 75-12-7,

Formamide, reactions

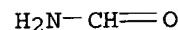
RL: RCT (Reactant); RACT (Reactant or reagent)
 (preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

RN 75-07-0 HCPLUS

CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)

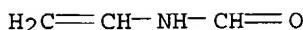


RN 75-12-7 HCPLUS
 CN Formamide (8CI, 9CI) (CA INDEX NAME)



IT 13162-05-5P, **N-Vinylformamide**
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of alkenyl carboxylic amides via reaction of amides with carbonyl compds. in presence of base)

RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 9 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1995:294831 HCAPLUS

DN 122:82330

ED Entered STN: 14 Jan 1995

TI Manufacture and polymerization of N-vinylformamide

IN Sato, Shinichi; Mori, Koji

PA Mitsubishi Chemical Industries Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C08F026-02

CC 35-4 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 23

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06287232	A2	19941011	JP 1993-73807	19930331
	JP 3365430	B2	20030114		
	US 5527963	A	19960618	US 1994-346578	19941016
PRAI	JP 1993-73807		19930331		

CLASS

PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

JP 06287232 ICM C08F026-02

AB In manufacture of the title polymer (I) by reaction of MeCHO with HCONH₂ in the presence of basic catalysts, reaction of the resulting MeCH(OH)NHCHO with primary or secondary alcs. in the presence of acidic catalysts, dealkanolation of the intermediate N-(α -alkoxyethyl) formamides by heating in gas phase, and polymerization of the resulting N-vinylformamide in the presence of radical initiators, contents of acetaldehydes in the N-(α -alkoxyethyl) formamides are adjusted to \leq 3.0%. Thus, MeCHO (containing 50 ppm AcOH) was treated with HCONH₂ (containing 500 ppm diformamide and \leq 10 ppm HCO₂H) in the presence of K₂CO₃ in PhMe at 20°, alkoxylated by MeOH with H₂SO₄ at 20° for 1 h, heated in a gas phase at 450°, and polymerized in Et cellulose-containing cyclohexane-H₂O in the presence of 2,2'-azobis(amidinopropane).HCl at 70° to give I having reduced viscosity 7.7 dL/g.

ST polyvinylformamide; acetaldehyde addn formamide; hydroxyethylformamide manuf alkoxylation; alkoxyethylformamide manuf dealkanolation; vinylformamide manuf polymn

IT Alcohols, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
(manufacture and polymerization of N-vinylformamide)

IT Alcohols, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
(secondary, manufacture and polymerization of N-vinylformamide)

IT 72018-12-3P, Poly(N-vinylformamide)

RL: IMF (Industrial manufacture); PREP (Preparation)
(manufacture and polymerization of N-vinylformamide)

IT 13162-05-5P, N-Vinylformamide 38591-94-5P,

N-(α -Methoxyethyl) formamide 102904-85-8P,

N-(α - Hydroxyethyl) formamide

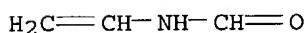
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

IT (manufacture and polymerization of N-vinylformamide)
 IT 67-56-1, Methanol, reactions 75-07-0, Acetaldehyde,
 reactions 75-12-7, Formamide, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (manufacture and polymerization of N-vinylformamide)
 IT 72018-12-3P, Poly(N-vinylformamide)
 RL: IMF (Industrial manufacture); PREP (Preparation)
 (manufacture and polymerization of N-vinylformamide)
 RN 72018-12-3 HCPLUS
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

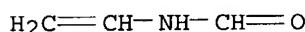
CM 1

CRN 13162-05-5

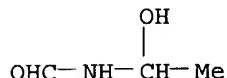
CMF C3 H5 N O



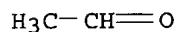
IT 13162-05-5P, N-Vinylformamide
 IT 102904-85-8P, N-(α -Hydroxyethyl)formamide
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP
 (Preparation); RACT (Reactant or reagent)
 (manufacture and polymerization of N-vinylformamide)
 RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



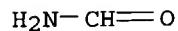
RN 102904-85-8 HCPLUS
 CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



IT 75-07-0, Acetaldehyde, reactions 75-12-7,
 Formamide, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (manufacture and polymerization of N-vinylformamide)
 RN 75-07-0 HCPLUS
 CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCPLUS
 CN Formamide (8CI, 9CI) (CA INDEX NAME)



ED Entered STN: 17 Sep 1994
 TI Purification of N-vinylformamide for use as monomer
 IN Sato, Shinichi; Tanaka, Akihiko
 PA Mitsubishi Chemical Industries Co., Ltd., Japan
 SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C233-03

ICS C07C231-18

CC 23-18 (Aliphatic Compounds)

Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06122661	A2	19940506	JP 1992-251263	19920921
	JP 3314417	B2	20020812		
PRAI	JP 1992-251263			19920921	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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JP 06122661	ICM	C07C233-03
	ICS	C07C231-18

AB In the title method, crude N-vinylformamide (I) is distilled in the presence of an alkali earth metal oxide, hydroxide, etc. The I-containing fraction (obtained from distillation) is mixed with an acid.

Said fraction is then redistd. Thus, crude I was mixed with calcium oxide and then distilled. The I-containing fraction (obtained from distillation) was mixed with a sulfuric acid-methanol mixture and distilled to give I (95% purity), vs. 93% purity in a reference process.

ST vinylformamide prepn purifn

IT Polymers, preparation

RL: PREP (Preparation)
 (intermediate for, vinylformamide as)

IT 1305-78-8, Calcium oxide, uses

RL: USES (Uses)
 (distillation of vinylformamide in presence of)

IT 13162-05-5P, N-Vinylformamide
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation and purification of)

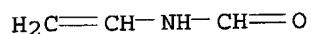
IT 38591-94-5P, N-(α -Methoxyethyl) formamide
 102904-85-8P, N-(α - Hydroxyethyl) formamide
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (preparation and reaction of, in preparation of vinylformamide)

IT 72018-12-3P, N-Vinylformamide homopolymer
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of)

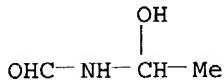
IT 75-07-0, Acetaldehyde, reactions 75-12-7,
 Formamide, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (reaction of, in preparation of vinylformamide)

IT 13162-05-5P, N-Vinylformamide
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation and purification of)

RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)

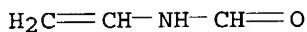


IT 102904-85-8P, N-(α - Hydroxyethyl)formamide
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
 (preparation and reaction of, in preparation of vinylformamide)
 RN 102904-85-8 HCPLUS
 CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)

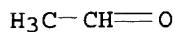


IT 72018-12-3P, N-Vinylformamide homopolymer
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation of)
 RN 72018-12-3 HCPLUS
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

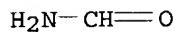
CM 1

CRN 13162-05-5
CMF C3 H5 N O

IT 75-07-0, Acetaldehyde, reactions 75-12-7,
 Formamide, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (reaction of, in preparation of vinylformamide)
 RN 75-07-0 HCPLUS
 CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



RN 75-12-7 HCPLUS
 CN Formamide (8CI, 9CI) (CA INDEX NAME)



L92 ANSWER 11 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1993:626638 HCPLUS
 DN 119:226638
 ED Entered STN: 27 Nov 1993
 TI Recovery of N-vinylformamide
 IN Sato, Shinichi; Mori, Koji
 PA Mitsubishi Chemical Industries Co., Ltd., Japan
 SO Jpn. Kokai Tokkyo Koho, 4 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C07C233-09
 ICS B01D001-22; B01D003-14; C07C231-24
 CC 35-2 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 23

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 05155829	A2	19930622	JP 1991-318209	19911202
	JP 3128902	B2	20010129		
PRAI	JP 1991-318209			19911202	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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JP 05155829	ICM	C07C233-09
	ICS	B01D001-22; B01D003-14; C07C231-24

AB **N-vinylformamide** prepare by pyrolysis was recovered from a solution without thermal decomposition by using a film evaporator and a rectifying column. Without the prior evaporation, rectification resulted in 7.5% decomposition

ST film evapn rectification vinylformamide

IT Distillation apparatus
(film evaporators and, for purification of vinylformamide)

IT Thermal decomposition
(of (ethoxyethyl) formamide)

IT Etherification
(of (hydroxyethyl) formamide, with methanol)

IT Evaporators
(film, rectifying column and, for purification of vinylformamide)

IT 67-56-1, Methanol, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification by, of (hydroxyethyl) formamide)

IT 102904-85-8, N-(α - Hydroxyethyl) formamide
RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification of, with methanol)

IT 13162-05-5P, N-Vinylformamide
RL: PUR (Purification or recovery); PREP (Preparation)
(purification of, film evaporators and rectifying column for)

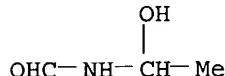
IT 50-00-0, Formaldehyde, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with acetaldehyde)

IT 75-07-0, Acetaldehyde, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with formamide)

IT 102904-85-8, N-(α - Hydroxyethyl) formamide
RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification of, with methanol)

RN 102904-85-8 HCPLUS

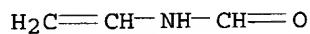
CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



IT 13162-05-5P, N-Vinylformamide
RL: PUR (Purification or recovery); PREP (Preparation)
(purification of, film evaporators and rectifying column for)

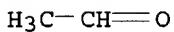
RN 13162-05-5 HCPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)

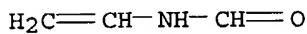


IT 75-07-0, Acetaldehyde, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
 (reaction of, with **formamide**)
 RN 75-07-0 HCPLUS
 CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



L92 ANSWER 12 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1993:517885 HCPLUS
 DN 119:117885
 ED Entered STN: 18 Sep 1993
 TI Water-soluble copolymers. 47. Copolymerization of maleic anhydride and
N-vinylformamide
 AU Chang, Yihua; McCormick, Charles L.
 CS Dep. Polym. Sci., Univ. South. Mississippi, Hattiesburg, MS, 39406-0076,
 USA
 SO Macromolecules (1993), 26(18), 4814-17
 CODEN: MAMOBX; ISSN: 0024-9297
 DT Journal
 LA English
 CC 35-3 (Chemistry of Synthetic High Polymers)
 AB The free-radical copolyrn. of maleic anhydride (I) and **N-vinylformamide** (II) in homogeneous solution was studied in the range of 10-90 mol% II in the feed. The copolymer compns. were determined from elemental anal. and ¹³C NMR. Reactivity ratios were calculated by Fineman-Ross, Kelen-Tudos, and nonlinear least-squares methods and indicate that the monomer pair has a strong tendency to alternate. I and II formed a charge-transfer complex in both chloroform and THF. The equilibrium constant and composition of the charge-transfer complex were calculated from the modified Benesi-Hildebrand equation.
 ST charge transfer complex furandione vinylformamide; polymn reactivity maleic anhydride vinylformamide
 IT Reactivity ratio in polymerization (alternating, of maleic anhydride with vinylformamide)
 IT 13162-05-5, **N-Vinylformamide**
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (alternating polymerization of, with maleic anhydride, reactivity ratio in)
 IT 108-31-6, Maleic anhydride, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (alternating polymerization of, with vinylformamide, reactivity ratio in)
 IT 149696-83-3P
 RL: FORM (Formation, nonpreparative); PREP (Preparation)
 (formation of, in chloroform and THF)
 IT 149332-81-0P
 RL: SPN (Synthetic preparation); PREP (Preparation)
 (preparation and characterization of)
 IT 13162-05-5, **N-Vinylformamide**
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (alternating polymerization of, with maleic anhydride, reactivity ratio in)
 RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



IT 108-31-6, Maleic anhydride, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (alternating polymerization of, with vinylformamide, reactivity ratio in)

RN 108-31-6 HCPLUS
 CN 2,5-Furandione (9CI) (CA INDEX NAME)

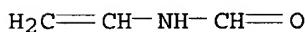


IT 149696-83-3P
 RL: FORM (Formation, nonpreparative); PREP (Preparation)
 (formation of, in chloroform and THF)

RN 149696-83-3 HCPLUS
 CN Formamide, N-ethenyl-, compd. with 2,5-furandione (1:1) (9CI) (CA INDEX NAME)

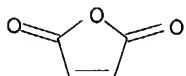
CM 1

CRN 13162-05-5
 CMF C3 H5 N O



CM 2

CRN 108-31-6
 CMF C4 H2 O3



L92 ANSWER 13 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1992:60187 HCPLUS
 DN 116:60187
 ED Entered STN: 21 Feb 1992
 TI Manufacture of ethylenebisformamide
 IN Watanabe, Hidekazu; Mori, Kenji; Ochiai, Kunie
 PA Mitsubishi Kasei Corp., Japan
 SO Jpn. Kokai Tokkyo Koho, 4 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C07C233-03
 ICS C07C231-08
 ICA B01J027-02; B01J027-06; B01J031-02; B01J031-08; C07B061-00
 CC 35-2 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 23

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 03236360	A2	19911022	JP 1990-32245	19900213
PRAI JP 1990-32245		19900213		
CLASS				
PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES		
JP 03236360	ICM	C07C233-03		

ICS C07C231-08
 ICA B01J027-02; B01J027-06; B01J031-02; B01J031-08;
 C07B061-00

AB The title compound (I), thermally decomposable into N-vinyformamide, is manufactured by condensing N-(α - hydroxyethyl) formamide (II) and **formamide** in the presence of an acid catalyst while removing H₂O formed in the reaction. Thus, heating II, **formamide**, and H₂SO₄ at 80° under N gave I with 70% conversion of II.

ST ethylidenebisformamide intermediate vinylformamide; thermal decompn ethylidenebisformamide; **hydroxyethylformamide** formamide condensation acid catalyst

IT Condensation reaction catalysts
 (acids, for condensation of N-(hydroxyethyl) formamide and **formamide**)

IT Acids, uses
 RL: CAT (Catalyst use); USES (Uses)
 (catalysts, for condensation of N-(hydroxyethyl) formamide and **formamide**)

IT Thermal decomposition
 (of ethylidenebisformamide, **N-vinylformamide** from)

IT Condensation reaction
 (of **formamide** with N-(hydroxyethyl) formamide)

IT 104-15-4, p-Toluenesulfonic acid, uses 7664-93-9, Sulfuric acid, uses
 RL: CAT (Catalyst use); USES (Uses)
 (catalyst, for condensation of N-(hydroxyethyl) formamide and **formamide**)

IT 102904-85-8, N-(α - Hydroxyethyl) formamide
 RL: USES (Uses)
 (condensation of, with **formamide**)

IT 75-12-7, **Formamide**, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (condensation of, with N-(hydroxyethyl) formamide)

IT 72018-12-3P
 RL: PREP (Preparation)
 (preparation of)

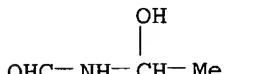
IT 13162-05-5P, **N-Vinylformamide**
 RL: PREP (Preparation)
 (preparation of, by thermal decomposition of ethylidenebisformamide)

IT 20602-52-2P, Ethylidenebisformamide
 RL: PREP (Preparation)
 (preparation of, intermediate for **N-vinylformamide**)

IT 102904-85-8, N-(α - Hydroxyethyl) formamide
 RL: USES (Uses)
 (condensation of, with **formamide**)

RN 102904-85-8 HCPLUS

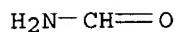
CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



IT 75-12-7, **Formamide**, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (condensation of, with N-(hydroxyethyl) formamide)

RN 75-12-7 HCPLUS

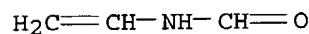
CN Formamide (8CI, 9CI) (CA INDEX NAME)



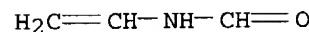
IT 72018-12-3P
 RL: PREP (Preparation)
 (preparation of)
 RN 72018-12-3 HCPLUS
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 13162-05-5
 CMF C3 H5 N O



IT 13162-05-5P, N-Vinylformamide
 RL: PREP (Preparation)
 (preparation of, by thermal decomposition of ethylenedibisformamide)
 RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 14 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1987:496345 HCPLUS
 DN 107:96345
 ED Entered STN: 19 Sep 1987
 TI Preparation of N-vinylformamide useful as a
 flocculant monomer
 IN Tamaru, Akio; Sato, Shinichi; Mori, Koji; Tsuruga, Masahiro
 PA Mitsubishi Chemical Industries Co., Ltd., Japan
 SO Jpn. Kokai Tokkyo Koho, 5 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C07C103-365
 ICS C07C102-00
 CC 23-18 (Aliphatic Compounds)
 Section cross-reference(s): 35

FAN.CNT 1	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 62059248	A2	19870314	JP 1985-199685	19850910	
JP 06004572	B4	19940119			
PRAI JP 1985-199685		19850910			

CLASS	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 62059248	ICM	C07C103-365	
	ICS	C07C102-00	

AB Title compound (I), useful as a monomer for flocculant water-soluble polymers,
 was prepared by etherification of HCONHCHMeOH (II) with polyhydric alcs.
 followed by liquid phase thermal decomposition under vacuum while distilling
 the resulting I. Thus, II, prepared by treating H₂NCHO with MeCHO in the
 presence of NaCO₃, was treated with HO(C₂H₄O)₃H and H₂SO₄ at 25-40°

for 3 h with the pH adjusted to 7.0. The mixture containing the resultant ether

was heated at 150-160° and 3 mm Hg for 2 h with distillation to give 74% I.

ST vinylformamide prep monomer flocculant; formamide hydroxyethyl etherification thermal decompn; etherification hydroxyethylformamide thermal decompn

IT Flocculating agents
(vinylformamide as)

IT 102904-85-8

RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification and thermal decomposition of, vinylformamide from)

IT 57-55-6, Propylene glycol, reactions 107-21-1, Ethylene glycol,
reactions 112-27-6, Triethylene glycol

RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification with, of (hydroxyethyl)formamide)

IT 13162-05-5P, N-Vinylformamide

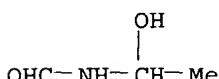
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of, by thermal decomposition of etherified (hydroxyethyl)formamide)

IT 102904-85-8

RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification and thermal decomposition of, vinylformamide from)

RN 102904-85-8 HCPLUS

CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)

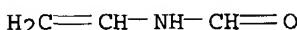


IT 13162-05-5P, N-Vinylformamide

RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of, by thermal decomposition of etherified (hydroxyethyl)formamide)

RN 13162-05-5 HCPLUS

CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



L92 ANSWER 15 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN

AN 1986:627548 HCPLUS

DN 105:227548

ED Entered STN: 26 Dec 1986

TI Manufacture of N-vinylformamide polymers

IN Murao, Yoshikazu; Sawayama, Shigeru; Sato, Koichi

PA Mitsubishi Chemical Industries Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C08F026-02

CC 35-4 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 61097309	A2	19860515	JP 1984-219301	19841018
	JP 05082402	B4	19931118		
PRAI	JP 1984-219301		19841018		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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JP 61097309	ICM	C08F026-02
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AB **N-Vinylformamide** (I) polymers with good water solubility and hydrophilicity are **prepared** in high yield without using toxic nitriles by addition reaction of **formamide** (II) with **acetaldehyde** (III) using basic catalysts, etherification of the **N-(α - hydroxyethyl)formamide** (IV) with primary or secondary alcs. using acidic catalysts, dealcoholation of the ether at 250-600°, and polymerization of the I. Hydrolysis of I polymers gives polyvinylamines useful as coagulating agents, paper **manufacturing** reagents, ion exchange resins, and cationic high-mol.-weight electrolytes (no data). Thus, II 450, K₂CO₃ 6.9, and hexane 450 g were stirred at 25°, mixed with 530 g III over 3.5 h, stirred 30 min, and cooled to 5° to form a crystalline slurry which was treated with 961 g MeOH and 9.8 g H₂SO₄ at 25° for 4 h, then neutralized with 12.5 g aqueous NH₃, filtered, decanted, and concentrated in vacuo to form 961 g IV containing 2.5%

II.

IV was fed at 1.0 g/min along with 80 mL/min N to a reactor at 400° and 145 mm Hg, cooled, stripped of MeOH, and distilled to give 651 g I containing

4% II. I (10.4 g) and 0.3 g 10% aqueous N,N'-azobis(2-amidinopropane) hydrochloride were mixed at 50° for 8 h to give a polymer having reduced viscosity (25°, 1 g/dL in 1 N aqueous HCl) 6.3 dL/g, in 99.1% yield (84% based on the initial II), vs. 3.2 dL/g and 87.2% (12%) for a polymer **prepared** from lactonitrile and III.

ST vinylformamide manuf polynn water soly; etherification dealcoholation **formamide acetaldehyde** adduct; dealcoholation etherification **formamide acetaldehyde** adduct; polyvinylformamide manuf **formamide acetaldehyde** alc; **formamide acetaldehyde** addn etherification dealcoholation; polyvinylamine hydrolysis vinylformamide polymer

IT Alcohols, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification by, of hydroxyalkylformamide)

IT 75-12-7, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
(addition reaction of, with **acetaldehyde**)

IT 75-07-0, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)
(addition reaction of, with **formamide**)

IT 67-56-1, reactions 109-86-4

RL: RCT (Reactant); RACT (Reactant or reagent)
(etherification by, of hydroxyalkylformamide)

IT 72018-12-3P

RL: PREP (Preparation)
(manufacture of water soluble, from **formamide**, **acetaldehyde** and alcs.)

IT 13162-05-5P

RL: IMF (Industrial manufacture); PREP (Preparation)
(manufacture of, by dealcoholation of alkoxyethyl **formamides**)

IT 38591-94-5P 100579-03-1P

RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation and dealcoholation of)

IT 102904-85-8P

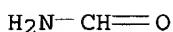
RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(preparation and etherification of)

IT 75-12-7, reactions

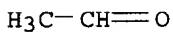
RL: RCT (Reactant); RACT (Reactant or reagent)
(addition reaction of, with **acetaldehyde**)

RN 75-12-7 HCPLUS

CN Formamide (8CI, 9CI) (CA INDEX NAME)



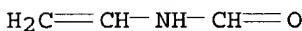
IT 75-07-0, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (addition reaction of, with formamide)
 RN 75-07-0 HCPLUS
 CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



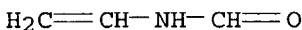
IT 72018-12-3P
 RL: PREP (Preparation)
 (manufacture of water soluble, from formamide, acetaldehyde
 and alcs.)
 RN 72018-12-3 HCPLUS
 CN Formamide, N-ethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

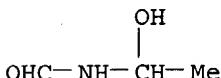
CRN 13162-05-5
 CMF C3 H5 N O



IT 13162-05-5P
 RL: IMF (Industrial manufacture); PREP (Preparation)
 (manufacture of, by dealcoholation of alkoxyethyl
 formamides)
 RN 13162-05-5 HCPLUS
 CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



IT 102904-85-8P
 RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
 (preparation and etherification of)
 RN 102904-85-8 HCPLUS
 CN Formamide, N-(1-hydroxyethyl)- (9CI) (CA INDEX NAME)



L92 ANSWER 16 OF 16 HCPLUS COPYRIGHT 2004 ACS on STN
 AN 1985:132634 HCPLUS
 DN 102:132634
 ED Entered STN: 20 Apr 1985
 TI Ethylenediformamide, and its use in preparing
 poly(vinylamine) and its salts
 IN Dawson, Daniel J.; Otteson, Kenneth M.

PA Dynapol, USA
 SO U.S., 10 pp.
 CODEN: USXXAM
 DT Patent
 LA English
 IC ICM C07C102-00
 NCL 564159000
 CC 35-2 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 23

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4490557	A	19841225	US 1981-318615	19811105
	US 4578515	A	19860325	US 1984-618420	19840607
PRAI	US 1981-318615			19811105	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 4490557	ICM	C07C102-00
	NCL	564159000

OS CASREACT 102:132634

AB Ethylidenebisformamide (I) [20602-52-2] is prepared by contacting a liquid mixture of formamide [75-12-7], acetaldehyde [75-07-0], and an NH₃ scavenger with an acetic catalyst at > 50°, and I can be pyrolyzed to give N-vinylformamide (II) [13162-05-5], the polymer of which is hydrolyzable by acid to poly(vinylamine). Thus, 260 g formaldehyde and 10 g Ac₂O were mixed with 70 g acetic ion exchanger catalysts, mixed slowly with 44 g acetaldehyde, heated 70 min at 50-54°, mixed with 10 g Ac₂O, and heated 2.5 h at 50-54°. The reaction product was fed to a wiped-film evaporator at 7.75-10.6 mL/min to give 72% I, which (30 g) was melted, poured into an evaporator, passed into a pyrolysis tube having temperature at 5 points

365-371,
254-266, 369-454, 543-541, and 577-607°, and collected under vacuum to give 86-87% II.

ST ethylidenebisformamide acetaldehyde formamide condensation; vinylformamide pyrolysis ethylidenebisformamide

IT 75-12-7, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(condensation of, with acetaldehyde)

IT 75-07-0, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(condensation of, with formamide)

IT 20602-52-2P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(preparation and pyrolysis of)

IT 13162-05-5P
RL: PREP (Preparation)
(preparation of, by pyrolysis of ethylidenebisformamide)

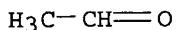
IT 75-12-7, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(condensation of, with acetaldehyde)

RN 75-12-7 HCPLUS
CN Formamide (8CI, 9CI) (CA INDEX NAME)

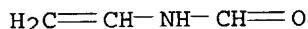
H₂N—CH=O

IT 75-07-0, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)

(condensation of, with formamide)
RN 75-07-0 HCPLUS
CN Acetaldehyde (8CI, 9CI) (CA INDEX NAME)



IT 13162-05-5P
RL: PREP (Preparation)
(preparation of, by pyrolysis of ethylenbisformamide)
RN 13162-05-5 HCPLUS
CN Formamide, N-ethenyl- (9CI) (CA INDEX NAME)



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L111 ANSWER 1 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
AN 2004-304767 [28] WPIX
DNC C2004-115788
TI Producing N-vinylformamide, useful as monomer, by
reacting hydroxyethyl formamide with reactant
including cyclic anhydride group(s) to form ester, and
dissociating the ester to synthesize N-vinylformamide
and compound having diacid group(s).
DC A41 E16
IN BECKMAN, E J; CAPELLI, C C; CHAPMAN, T M; FAVERO, C G; SWIFT, H E
PA (SNFS-N) SNF SA; (UYPI-N) UNIV PITTSBURGH
CYC 104
PI WO 2004020395 A1 20040311 (200428)* EN 27 C07C231-12
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS

LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
 W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK
 DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR
 KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH
 PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VC VN
 YU ZA ZM ZW

AU 2003265840 A1 20040319 (200462) C07C231-12
 ADT WO 2004020395 A1 WO 2003-US27084 20030829; AU 2003265840 A1 AU
 2003-265840 20030829

FDT AU 2003265840 A1 Based on WO 2004020395
 PRAI US 2002-407077P 20020830

IC ICM C07C231-12
 ICS C07C233-03; C07F007-18

AB WO2004020395 A UPAB: 20040429

NOVELTY - Production of **N-vinylformamide** (NVF)
 involves reacting **hydroxyethyl formamide** with a
 reactant including at least one cyclic **anhydride** group to form
 an ester, and dissociating the ester to synthesize **N-**
vinyformamide and a compound including at least one diacid group.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a
 reagent comprising at least one cyclic **anhydride** group
 covalently tethered to a solid support.

USE - **N-vinylformamide** is a monomer that is
 free-radically polymerizable to produce water-soluble poly(**N-**
vinyformamide) and also undergoes controlled radical
 polymerization using RAFT methodology.

ADVANTAGE - The process can be carried out continuously or batchwise,
 and requires less stringent conditions than current synthetic routes and
 hence can provide a product of increased purity and allow for generation
 of higher molecular weight poly(NVF).

Dwg.0/5

FS CPI
 FA AB; DCN
 MC CPI: A01-D06; A12-W11K; E06-A01; E07-A01; E10-D03C; E11-G
 TECH UPTX: 20040429

TECHNOLOGY FOCUS - POLYMERS - Preferred Compounds: The reactant including
 at least one cyclic **anhydride** group is **succinic**
anhydride, **maleic anhydride**, **phthalic**
anhydride, a polymer including at least one cyclic
anhydride group, or a solid support to which at least one cyclic
anhydride group is covalently tethered. The cyclic
anhydride is regenerated from a diacid formed in the synthesis of
 the ester by dehydrating the diacid. **Toluene** or
acetaldehyde is used as a solvent. The polymer including at least
 one cyclic **anhydride** group, the polymer including at least one
 ester group, and the polymer including at least one diacid group has no or
 limited solubility in the solvent. The polymer includes cyclic
anhydride groups and is a copolymer of methyl vinyl ether and
maleic anhydride having a weight average molecular
 weight of approximately 190000-300000. The polymer is a reaction product
 of an alpha olefin or a mixture of alpha olefins with **maleic**
anhydride. The alpha olefin is an 18C alpha-olefin. The polymer is
 a methyl vinyl ether/**maleic anhydride** decadiene
 copolymer. It is a copolymer of styrene and **maleic**
anhydride. The polymer is a solid in the reaction or a porous
 crosslinked solid. The polymer is a crosslinked polymer including styrene
 and **maleic anhydride** repeat units. The solid support
 is silica. The **acetaldehyde** to **formamide** mole ratio is
 at least 2.

Preferred Property: The polymer has a molecular weight of at least 20000.

The copolymer has a weight average molecular weight of at least 2000.

Preferred Process: The process includes regenerating the polymer including
 at least one cyclic **anhydride** group by heating the polymeric

material containing at least one diacid group to a high temperature to dehydrate diacid groups. The temperature used to dehydrate diacid groups is higher than a temperature used to dissociate the ester by heat.

Acetaldehyde, formamide, and the reactant including at least one cyclic anhydride group are mixed in a single reaction vessel, and hydroxyethyl formamide is formed in the reaction vessel to react with the reactant including at least one cyclic anhydride group. A base or an acid catalyst is used in the reaction to make hydroxyethyl formamide.

ABEX

UPTX: 20040429

EXAMPLE - 5.66 ml **acetaldehyde** were dissolved in 20 ml dioxane. 1 ml **formamide** containing 0.5 mol% potassium carbonate was added dropwise, and the reaction was stirred at 10-15 degreesC for 2 hours. 8.29 g poly(styrene-co-maleic anhydride) was dissolved in 50 ml dioxane and the solution was added to the reaction. Infrared monitoring was done throughout the reaction. **Anhydride** peaks reduced but did not completely disappear in infrared over the time the reaction was carried out. Synthesis of NVF was confirmed by nuclear magnetic resonance.

L111 ANSWER 2 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
 AN 1996-210957 [22] WPIX
 DNC C1996-067417
 TI Simple preparation of N-alkenyl-carboxamide cpds especially **N-vinyl-formamide** - involves reacting amide and carbonyl cpd. in presence of base and carboxylic acid derivative, useful in polyvinyl amine production.
 DC A41 B05 E19 F09
 IN HEIDER, M; HENKELMANN, J; RUEHL, T
 PA (BADI) BASF AG
 CYC 7
 PI EP 709367 A1 19960501 (199622)* GE 8 C07C231-08
 R: BE DE FR GB NL
 DE 4438366 A1 19960502 (199623) 5 C07C233-03
 JP 08208575 A 19960813 (199642) 5 C07C233-02
 EP 709367 B1 19970827 (199739) GE 7 C07C231-08
 R: BE DE FR GB NL
 DE 59500563 G 19971002 (199745) C07C231-08
 US 5710331 A 19980120 (199810) 4 C07C231-08
 ADT EP 709367 A1 EP 1995-116459 19951019; DE 4438366 A1 DE 1994-4438366
 19941027; JP 08208575 A JP 1995-280758 19951027; EP 709367 B1 EP
 1995-116459 19951019; DE 59500563 G DE 1995-500563 19951019, EP
 1995-116459 19951019; US 5710331 A US 1995-548724 19951026
 FDT DE 59500563 G Based on EP 709367
 PRAI DE 1994-4438366 19941027
 REP 3.Jnl.Ref; DE 3443463; EP 184074; FR 2558156; JP 62059248; 2.Jnl.Ref
 IC ICM C07C231-08; C07C233-02; C07C233-03
 ICS C07C231-04; C07C231-12; C07C233-05; C07C233-11; C07C233-58;
 C07C233-65
 AB EP 709367 A UPAB: 19960604
 Preparation of N-alkenyl-carboxamide of formula (I) comprises (a) reacting an amide of formula (II) with a carbonyl cpd. of formula (III) in the presence of a base and either carrying out or continuing reaction in the presence of a carboxylic acid deriv of formula (IV); and (b) isolating (I).
 R1-CONH-CR2=CR3R4 (I) R1-CO-NH2 (II)
 R2-CO-CHR3R4 (III) R5-CO-X (IV)
 R1-R4 = H or a (cyclo)aliphatic or aromatic gp, opt with inert substit; R5 = H, alkyl or aryl; X = halogen or an alkoxy or carboxyalkyl gp.
 USE - The process is used for preparing **N-vinylformamide** (IA) (claimed). (I) are intermediates, which can be polymerised and hydrolysed to the corresp polyvinylamines. These, especially

polyvinyl formamine, are useful in the prodn of dyes, pharmaceuticals, flocculants and viscosity regulators for the paper industry.

ADVANTAGE - The process is simple, uses readily available educts, proceeds at mild reaction temps and gives high (I) yields. It avoids the problems associated with pyrolysis of ethylidene formamide, N-acetylethyl formamide, N-alkoxyethyl formamide, N-hydroxyethylformamide or N-cyanoethylformamide, which is relatively costly and gives unsatisfactory total yields as a result of losses at the high reaction temps. required.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D06; A10-E09; B10-D03; E10-D03C; E10-D03D; F05-A06C

ABEQ EP 709367 B UPAB: 19970926

A process for the preparation of N-alkenylcarboxamides of the formula R₁-CO-NH-CR₂=CR₃R₄ (I) where R₁ to R₄, independently of one another, are each hydrogen or an aliphatic, cycloaliphatic or 6-10C aryl radical which may carry halogen, nitro, alkoxy or alkyl, wherein an amide of the formula R₁-CO-NH₂ (II) where R₁ has the above-mentioned meanings, and a carbonyl compound of the formula R₂-CO-CHR₃R₄ (III) where R₂ to R₄ have the above-mentioned meanings, are reacted in a ratio of carbonyl compound (III) to amide (II) of from 0.5 to 10 equivalents, in the presence of a base at from 0 to 150 deg. C. a) the reaction either being carried out in the presence of a carboxylic acid derivative of the formula R₅-CO-X (IV) where R₅ is hydrogen, alkyl or aryl and X is halogen, alkoxy or carboxyalkyl, in a ratio of carboxylic acid derivative IV to amide (II) of from 0.5 to 10 equivalents, b) or being continued in the presence of a carboxylic acid derivative of the formula (IV) in a ratio of carboxylic acid derivative (IV) to amide (II) of from 0.5 to 10 equivalents, and the amide of the formula is isolated.

Dwg.0/0

ABEQ US 5710331 A UPAB: 19980309

Prepn. of N-alkenyl-carboxamide of formula (I) comprises (a) reacting an amide of formula (II) with a carbonyl cpd. of formula (III) in the presence of a base and either carrying out or continuing reaction in the presence of a carboxylic acid deriv of formula (IV); and (b) isolating (I).

R₁-CONH-CR₂=CR₃R₄ (I) R₁-CO-NH₂ (II)

R₂-CO-CHR₃R₄ (III) R₅-CO-X (IV)

R₁-R₄ = H or a (cyclo)aliphatic or aromatic gp, opt with inert substs; R₅ = H, alkyl or aryl; X = halogen or an alkoxy or carboxyalkyl gp.

USE - The process is used for preparing N-vinylformamide (IA) (claimed). (I) are intermediates, which can be polymerised and hydrolysed to the corresp polyvinylamines. These, esp. polyvinyl formamine, are useful in the prodn of dyes, pharmaceuticals, flocculants and viscosity regulators for the paper industry.

ADVANTAGE - The process is simple, uses readily available educts, proceeds at mild reaction temps and gives high (I) yields. It avoids the problems associated with pyrolysis of ethylidene formamide, N-acetylethyl formamide, N-alkoxyethyl formamide, N-hydroxyethylformamide or N-cyanoethylformamide, which is relatively costly and gives unsatisfactory total yields as a result of losses at the high reaction temps. required.

Dwg.0/0

L111 ANSWER 3 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1995-063810 [09] WPIX

DNC C1995-028335

TI Preparation of formamide for use in preparation of N-vinylformamide - comprises reacting formate with ammonia in the presence of alcohol, without water and catalyst present.

DC A41 E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06340601 A 19941213 (199509)* 4 C07C233-03

ADT JP 06340601 A JP 1993-129255 19930531

PRAI JP 1993-129255 19930531

IC ICM C07C233-03

ICS C07C231-02

AB JP 06340601 A UPAB: 19950306

Preparation of **formamide** comprises reaction of formate with ammonia in the presence of 20 weight% or more alcohol based on formate under being free from water and catalysts. Formate is prepared by esterification of formic acid which is obtd. by hydrolysis of polymer N-vinyl formamide.

USE/ADVANTAGE - Used as a material for N-(a-hydroxyethyl) formamide which is the intermediate for preparing N-vinylformamide. Formamide with less impurities is obtd.

Formic acid used is the by-product which is produced in the process of the preparation of polyvinylamine.

In an example, to a solution of methyl formate (219g, consisting of 80.2 weight% methyl formate, 19.6 weight% methanol and 0.2 weight% water), methanol (9.7g) was added to be 30 weight% methanol in total based on methyl formate, then anhydrous ammonia gas (54.6g) was blown in over 3 hrs. at 25 deg.C under the atmospheric press. And it was matured for 1 hr. The conversion of methyl formate was 98% and the selectivity of **formamide** was 99%. Simple distillation of the reaction solution was carried out at 3 Torr to give **formamide** in 95% distillation yield, which contains 1.3 weight% ammonium formate.

Dwg.0/0

FS CPI

FA AB; GI; DCN

MC CPI: A01-D06; E10-D03C

L111 ANSWER 4 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1995-011783 [02] WPIX

DNC C1995-005215

TI Economical preparation of N-(alpha-hydroxyethyl) formamide - comprises reaction of **formamide** with **acetaldehyde** and regeneration of solvent to use repeatedly.

DC E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06298713 A 19941025 (199502)* 5 C07C233-18

JP 3319020 B2 20020826 (200263) 5 C07C233-18

ADT JP 06298713 A JP 1993-86398 19930413; JP 3319020 B2 JP 1993-86398 19930413

FDT JP 3319020 B2 Previous Publ. JP 06298713

PRAI JP 1993-86398 19930413

IC ICM C07C233-18

ICS C07C231-08; C07C231-12

ICA C07B061-00

AB JP 06298713 A UPAB: 19950117

Preparation of N-(alpha-hydroxyethyl) **formamide**(I) comprises (1) reaction of **formamide**(II) with **acetaldehyde**(III) in water-immiscible solvent(IV) in the presence of base catalyst(V), (2) isolation of (I) from the reaction mixture and, (3) recycling the mother liquor to process (1) to reuse as reaction solvent.\$

Preparation of N-(alpha-alkoxyethyl) **formamide**(s)(VI) comprises (1) reaction of (II) with (III) in (IV) in the presence of (V) to prepare (I), (2) reaction of (I) with alcohol(s)(VII) in the presence of acid catalyst(IX), (3) separation of (VI) from the reaction prod., (4) washing the mother liquor separated in (3) with acid solution, (5) recycling the treated mother liquor to (1), to reuse as reaction solvent.\$

Using one or more aliphatic hydrocarbon, aromatic hydrocarbon, halogenated hydrocarbon as (IV), and washing the mother liquor with acid

solution before reuse as specifically claimed.\$

(II) is pref. reacted with 1-5 mol.-fold (III) in the presence of (V)((e.g. sodium (bi)carbonate, potassium phosphate etc.) in (IV) (0.2-10 weight-fold to (II)) at pref. 0.40 deg. C. (VII)(pref. methanol, 2.0-30 mol.-fold to (I) and (IX)(pref. sulphuric acid, methanesulphonic acid etc., 0.1-5 mol.% to (I)) are added, the reaction of (I) with (VII) is carried out at -10 deg. C to 60 deg. C(pref. 0.40 deg. C). (IX) is neutralised, the prod. is stood, (IV) layer is separated, washed with acid solution(e.g. 0.01-10 weight% mineral acid) and returned to (I) preparation to reuse

as (IV).\$

USE/ADVANTAGE - (I) is used as intermediate for preparation of (VI) which is used as material for preparation of **N-vinylformamide**. Mother liquor is regenerated and reused, (I) is prepared more economically than previously.

In an example, potassium carbonate(1.33g)/(III)(200g) solution was added to mixture of (III)(235g)/**toluene**(899g) at 20 deg. C to prepare (I). Solid was filtered, the filtrate was washed with 1% sulphuric acid(800g) and water (800g) sucessively, returned to (I) preparation. **Toluene** regenerated is used as reaction solvent without trouble.

Dwg.0/0

FS CPI
FA AB; DCN
MC CPI: E10-D03C; N01-A01; N04-B

L111 ANSWER 5 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
 AN 1994-363588 [45] WPIX
 DNC C1994-165855
 TI Production of **N-vinyl formamide** polymer - comprises reacting **acetaldehyde** with **formamide** in presence of basic catalyst(s), reacting with prim. alcohol(s) in presence of acid catalysts, heating and polymerising..
 DC A14
 PA (MITU) MITSUBISHI KASEI CORP
 CYC 1
 PI JP 06287232 A 19941011 (199445)* 6 C08F026-02
 JP 3365430 B2 20030114 (200308) 6 C08F026-02
 ADT JP 06287232 A JP 1993-73807 19930331; JP 3365430 B2 JP 1993-73807 19930331
 FDT JP 3365430 B2 Previous Publ. JP 06287232
 PRAI JP 1993-73807 19930331
 IC ICM C08F026-02
 AB JP 06287232 A UPAB: 19950207
 The production of **N-vinylformamide** (NVF) polymer comprises reacting **acetaldehyde** with **formamide** (FA) in the presence of basic catalyst to form **N-(hydroxyethyl) formamide** (NHEF) (process 1), reacting NHEF with prim. or sec. alcohols in the presence of acid catalysts to form **N-(alkoxyethyl) formamide** (NAEF) (process 2), heating NAEF containing below 3.0 weight % of AA and its derivs. in the vapour phase to extract alcohol from NAEF and obtaining NVF (process 3), polymerising NVF in the presence of radical initiators (process 4).

of NAEF contains below 0.5 weight % of 3-hydroxybutanal, below 0.5 weight % of crotonaldehyde, below 0.5 weight % of 1,1-dimethoxy-3-hydroxybutane, below 0.05 weight % of 2,4-hexadinal. Basic catalysts are used in amts. of 0.1-0.4 mole. % of FA. The amts. of AA and its derivs. contained in NAEF are controlled to below 3.0 weight % by distillation with distilling columns.

ADVANTAGE - High molecular weight NVF polymer is produced at high yields.

Dwg.0/0

FS CPI
FA AB; GI
MC CPI: A02-A03; A04-D

L111 ANSWER 6 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
 AN 1994-354704 [44] WPIX
 DNC C1994-161720
 TI N-(alpha-alkoxyethyl)formamide preparation - by reaction of N-(alpha-hydroxyethyl)formamide with alcohol in presence of acid catalyst, used to prepare N-vinyl-formamide.
 DC E16
 PA (MITU) MITSUBISHI KASEI CORP
 CYC 1
 PI JP 06279376 A 19941004 (199444)* 4 C07C233-18
 JP 3319007 B2 20020826 (200263) 4 C07C233-18
 ADT JP 06279376 A JP 1993-70090 19930329; JP 3319007 B2, JP 1993-70090 19930329
 FDT JP 3319007 B2 Previous Publ. JP 06279376
 PRAI JP 1993-70090 19930329
 IC ICM C07C233-18
 ICS B01J031-02; C07C231-08; C07C231-12; C07C231-14
 ICA C07B061-00
 AB JP 06279376 A UPAB: 19941223
 Preparation of N-(alpha-alkoxyethyl)formamide(s) (I) comprises (1) reaction of N-(alpha-hydroxyethyl)formamide (II) with excess alcohol(s) (III) in presence of acid catalyst, (2) recovering unreacted (III) from the reaction mixture, (3) dehydration of (III) recovered to lower water content below 15%, and, (4) feeding (III) regenerated as (a part of) material to process (1).
 USE/ADVANTAGE - (I) is useful as material for preparation of N-vinylformamide. Preparation of (I) comprising processes (1), (2) and (4) is known already, but (I) is obtd. in higher and more steady yield than prior arts by addition of process (3) to former procedure. Pref. (II) is prepared by reaction of formamide with formaldehyde and acetaldehyde in presence of base catalyst (e.g. sodium- or potassium-(bi)carbonate). (II) is reacted with 1.1-50 (pref. 2-30) mol-fold (III) (pref. 1-4C prim.- or sec.-alcohol(s) in presence of 0.1-5 mol% acid catalyst, (e.g. sulphuric acid, phosphoric acid etc.) at -10 deg.C to 60 deg.C (pref. 0-40 deg.C). Excess (III) is recovered by distillation, fractionated to remove water, water content in (III) regenerated is adjusted to 0.5-10 weight%. (III) regenerated is fed to process (1) as (a part of) material to become 60-95 mol% of (III) fed to process (1).
 Dwg.0/0
 FS CPI
 FA AB; GI; DCN
 MC CPI: E10-D03C; N01-A01; N04-B; N04-C

L111 ANSWER 7 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
 AN 1994-245670 [30] WPIX
 DNC C1994-111915
 TI Preparation of N-(alpha-alkoxyethyl)-formamide used for N-vinyl-formamide - by reacting N-(alpha-hydroxyethyl)-formamide obtd. from formamide and acetaldehyde with prim. or sec. alcohol in presence of acidic catalyst.
 DC E16
 PA (MITU) MITSUBISHI KASEI CORP
 CYC 1
 PI JP 06179644 A 19940628 (199430)* 6 C07C233-18
 JP 3182946 B2 20010703 (200139) 5 C07C231-08
 ADT JP 06179644 A JP 1992-334528 19921215; JP 3182946 B2 JP 1992-334528 19921215
 FDT JP 3182946 B2 Previous Publ. JP 06179644
 PRAI JP 1992-334528 19921215
 IC ICM C07C231-08; C07C233-18
 ICS B01J023-02; B01J027-04; B01J027-08; B01J027-25; B01J031-02;

B01J031-04; B01J031-08

ICA C07B061-00

AB JP 06179644 A UPAB: 19940914

Preparation of N-(alpha-alkoxyethyl)formamide (I) is effected by reaction of N-(alpha-hydroxyethyl)formamide (II), obtd. by reaction of formamide (III) with acetaldehyde in the presence of basic catalyst, with prim. or sec. alcohols in the presence of acidic catalyst. (III) contains below 1000 ppm diformamide.

Pref. acetaldehyde containing less than 300 ppm acetic acid is used. Purified (I) is obtd. by distillation of (I) under reduced pressure (maximum

temperature is 70-100 deg.C and the maximum pressure is 2-30 mmHg). In the preparation

of (II), the salt of strong alkali e.g. hydroxide of alkali metal (Li, Na or K etc.) and weak acid e.g. organic acid, phenols or sulphurous acid etc., is used as basic catalyst. The catalyst is used in an amount of 0.01-10 (0.1-5) mol% to (III). The mol ratio of (III) : acetaldehyde is 1 : 1.0-5.0. The reaction is carried out at (-)10-100 (0-40) deg.C. The prim. or sec. alcohol e.g. methanol, ethanol, etc. is used in an amount of 1.0-30 times mol to (II). Acidic catalyst e.g. H₂SO₄ or HCl etc. is used in an amount of 0.001-10 (0.1-5) mol%. The reaction is carried out at (-)10-60 (0-40) deg.C.

USE/ADVANTAGE - (I) is a useful material as an intermediate in the preparation of N-vinylformamide. (I), which has good thermal stability, is obtd. in high yield (95-97%).

Dwg.0/0

FS CPI

FA AB; GI; DCN

MC CPI: E10-D03C; N01-A; N04-C; N04-D; N05-E02; N05-E03

L111 ANSWER 8 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1994-186386 [23] WPIX

DNC C1994-084578

TI Prepn of N-vinyl formamide used as monomer includes addn of oxide, hydroxide or carbonate of alkaline earth metal or crude cpd.

DC A41 E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 06122661 A 19940506 (199423)* 6 C07C233-03

JP 3314417 B2 20020812 (200259) 6 C07C233-03

ADT JP 06122661 A JP 1992-251263 19920921; JP 3314417 B2 JP 1992-251263 19920921

FDT JP 3314417 B2 Previous Publ. JP 06122661

PRAI JP 1992-251263 19920921

IC ICM C07C233-03

ICS C07C231-18

AB JP 06122661 A UPAB: 19940727

Preparation of N-vinyl formamide (I) comprises adding oxide, hydroxide or carbonate of alkaline earth metal or crude (I). Process involves (1) distilling, adding inorganic acid to the distillate containing (I) to give pH 4.5-8.5 when diluted with water (5 weight times) and distilling again; and (2) distilling with a membrane evaporator, adding inorganic acid to the distillate containing (I) to give pH 4.5-8.5 when diluted with water (5 weight times), distilling with a membrane evaporator to recover, and refining with a tower.

ADVANTAGE - Stable (I) is prepared efficiently and used as a monomer.

In an example, N-(alpha-hydroxyethyl)formamide

(3kg), methanol (3.15kg) and sulphuric acid (25g) were reacted at 25-40 deg.C for 3 hrs. with stirring, then were distilled under 3 mmHg to give ether. The ether was fed at 2 g/min. into a stainless tube kept at 400 deg.C under 100 mmHg and the discharge gas was condensed immediately to

carry out thermal decomposition. The distillate (2.3kg) (NVF 64%, methanol 31%) was recovered. pH value was 4.5 when it was diluted with water being 5 weight times as much. The distillate added Ca oxide (2.9g) was kept at 10 deg.C for 1 hr. with stirring followed by removing insol. matter, then treating with membrane evaporator under 3 torr pressure, 125 deg.C vapour temperature, 500 g/hr. a feeding amount and 5 mins. of retention time to give

(I).

1N H₂SO₄ in methanol (7 ml) was added to the recovered solution, and distillation

treatment was carried out under the same conditions as above. The distillate consisted of 95% NVF, 4.5% formamide and 0.5% ether.

The recovery of (I) was 96%.

Dwg. 0/0

FS CPI

FA AB; GI; DCN

MC CPI: A01-D06; E10-D03D

L111 ANSWER 9 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1993-232314 [29] WPIX

DNC C1993-103388

TI Recovery of **N-vinyl formamide** from mixed solution - using thin film evaporator and distillation column, giving high purity

prod. without decomposition etc..

DC E16

PA (MITU) MITSUBISHI KASEI CORP

CYC 1

PI JP 05155829 A 19930622 (199329)* C07C233-09

JP 3128902 B2 20010129 (200113) 4 C07C231-24

ADT JP 05155829 A JP 1991-318209 19911202; JP 3128902 B2 JP 1991-318209 19911202

FDT JP 3128902 B2 Previous Publ. JP 05155829

PRAI JP 1991-318209 19911202

IC ICM C07C231-24; C07C233-09

ICS C07C233-03

ICA B01D001-22; B01D003-14

AB JP 05155829 A UPAB: 19931116

In the recovery of **N-vinyl formamide** by distillation of mixed solution which is obtd. by thermal decomposition method

and

contains **N-vinyl formamide**, the mixed solution is treated in a thin film evaporator at 70-150 deg. C under reduced pressure of 1-20 Torr to recover a greater portion of the mixed solution as evaporated matter. The evaporated matter is fractioned by means of a distillation column to recover **N-vinyl formamide** and residual unevaporated matter is removed from the system.

Low boiling alcohol may be removed by vacuum distillation at below 70 deg. C before the mixed solution is treated in the thin film evaporator. Pref. thermal decomposition method is to remove alcohol from **N-(alpha-alkoxy-ethyl) formamide** obtd. by etherification reaction of **N-(alpha-hydroxyethyl) formamide** with alcohol. The distillation column has a pressure of 1-20 Torr and a column temperature of 60-90 deg.

C..

ADVANTAGE - High purity **N-vinyl formamide** is recovered efficiently without causing decomposition or polymerisation of **N-vinyl formamide**.

FS CPI

FA AB; DCN

MC CPI: E10-D03C; E11-Q01

L111 ANSWER 10 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1991-350881 [48] WPIX

DNC C1991-151430
 TI Ethyldene-bis formamide preparation; used to prepare N-vinyl formamide - by dehydration on N-(alpha-hydroxyethyl) formamide with formamide in presence of acid catalyst.

DC A41 E16
 PA (MITU) MITSUBISHI KASEI CORP
 CYC 1
 PI JP 03236360 A 19911022 (199148)*
 ADT JP 03236360 A JP 1990-32245 19900213
 PRAI JP 1990-32245 19900213
 IC B01J027-02; B01J031-02; C07B061-00; C07C231-08; C07C233-03
 AB JP 03236360 A UPAB: 19930928
 Ethyldene bis-formamide (I) is prepared by dehydration of N-(alpha-hydroxyethyl) formamide (II) with formamide in the presence of acid catalysts (III). Water produced in the reaction leads to outside of the reactor.
 Specifically, (II) is prepared by addition reaction of formamide with acetaldehyde in the presence of weak basic catalysts. Inorganic acid, organic acid and solid acid catalysts (e.g. ion exchange resin, etc.) etc. pref. strong acid catalysts (e.g. H₂SO₄, HCl, and HNO₃, etc.) are used as (III). (III) is used 0.1-100 mol% pref. 1-20 mol.% of (II). The reaction is at 0-120 (5-90) deg.C.
 USE/ADVANTAGE - N-vinylformamide a good material for water-soluble polymer, can be prepared in high yield from high pure (I) given by this method.

0/0
 FS CPI
 FA AB; DCN
 MC CPI: A01-D06; E10-D03A; N04; N05-E; N06

L111 ANSWER 11 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
 AN 1988-001052 [01] WPIX
 DNC C1988-000429
 TI Preparation of N-(alpha-alkoxyethyl)formamide derivs. - by reacting formamide and acetaldehyde in alcohol, with basic catalyst, and etherification of N-(alpha-hydroxyethyl)-formamide.

DC E16
 IN FIKENTSCHÉ, R; KROENER, M; OFTRING, A
 PA (BADI) BASF AG
 CYC 4
 PI EP 251118 A 19880107 (198801)* GE 5
 R: DE FR GB
 DE 3622013 A 19880107 (198802)
 JP 63014761 A 19880121 (198809)
 EP 251118 B 19900411 (199015) GE
 R: DE FR GB
 DE 3762238 G 19900517 (199021)
 ADT EP 251118 A EP 1987-108949 19870623; DE 3622013 A DE 1986-3622013
 19860701; JP 63014761 A JP 1987-153583 19870622
 PRAI DE 1986-3622013 19860701
 REP 1.Jnl.Ref; A3...8838; DE 3520829; FR 2558156; JP 61097309; No.SR.Pub; US
 4567300
 IC B01J027-02; B01J031-02; C07C102-00; C07C103-38; C07C231-08; C07C233-17
 AB EP 251118 A UPAB: 19930923
 N-substd. formamides of formula CH₃-CH(OR)-NH-CHO (I) are prepared by (a) reacting formamide with acetaldehyde, in presence of a basic catalyst and of 1-8C alcohol in ratio by weight of formamide: alcohol of 1-15:1, to form N-(alpha-hydroxyethyl)-formamide (II), and (b) etherifying (II) with a 1-8C alcohol in presence of acid catalysts. R = residue of a 1-8C alcohol.

USE/ADVANTAGE - Use of aliphatic or aromatic hydrocarbons as diluent is avoided. The cpd. (II) pptes. as fine crystals without clumping, and can be etherified without purification. Addition of crystallisation nuclei is not necessary. The cpds. (I) are raw materials for preparation of N-vinylformamide (III) by pyrolysis of (I) at above 400 deg. C and 10-200 mbars. The cpd. (III) gives polymers which have a higher rate of dewatering and retention in paper production, and which are also flocculating agents for slurries.

0/0

FS CPI

FA AB

MC CPI: E10-D03D; N06

ABEQ EP 251118 B UPAB: 19930923

A process for the preparation of an N-substituted formamide of the formula (I) where R is a radial of a 1-8C alcohol, by reacting formamide with acetaidehyde in the presence of a basic catalyst to give N-(alpha-hydroxyethyl)-formamide and then etherifying the N-(alpha-hydroxyethyl)-formamide with a 1-8C alcohol in the presence of an acidic catalyst, wherein the reaction of formamide with acetaldehyde is carried out in the presence of a 1-8C alcohol, the weight ration of formamide to alcohol being from 1:1 to 15:1.

L111 ANSWER 12 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN
AN 1987-112976 [16] WPIX

DNC C1987-047146

TI N-Vinyl formamide preparation in high yield - by etherifying N-(alpha-hydroxyethyl) formamide with polyhydric alcohol(s) and pyrolysing prod. while distilling off N-vinyl formamide obtd.

DC E16

PA (MITU) MITSUBISHI CHEM IND LTD

CYC 1

PI JP 62059248 A 19870314 (198716)* 5
JP 06004572 B2 19940119 (199406) 4 C07C233-03

ADT JP 62059248 A JP 1985-199685 19850910; JP 06004572 B2 JP 1985-199685
19850910

FDT JP 06004572 B2 Based on JP 62059248

PRAI JP 1985-199685 19850910

IC C07C102-00; C07C103-36

ICM C07C233-03

ICS C07C102-00; C07C103-36; C07C231-12

AB JP 62059248 A UPAB: 19930922

N-vinylformamide (I) is prepared by (1) etherifying N-(alpha-hydroxyethyl) formamide (II) by treating with polyhydric alcohol(s) followed by (2) pyrolysis of etherified cpd(s) with simultaneous removal of (I) from the prod. by distillation

Pref. (II) is heated with polyhydric alcohol(s), especially diol(s), opt. triethylene glycol, in presence of acid catalyst(s) (e.g. sulphuric acid, phosphoric acid etc.) to 0-100 deg.C, especially 10-50 deg.C. Molar ratio of diol(s)/(II) is 0.5-7, especially 1.2-4, and etherification is carried out

until

conversion of (II) is above 80%, especially 90% or more. Pyrolysis of the ether(s) is carried out at 90-200 deg.C especially 120-180 deg.C, under 20 mmHg or less, especially 10-1 mmHg pressure. (I) is distilled off with polyhydric alcohol(s) and the distillate is fractionated under reduced pressure to obtain high purity (I).

ADVANTAGE - High purity (I) is prepared in high yield without forming polymerised by-prods. Pyrolysis is carried out lower temps. than vapour phase pyrolysis. Heat energy can be economised.

0/0

FS CPI

FA AB; DCN

MC CPI: E10-D03D; N04-B; N04-C

L111 ANSWER 13 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1986-165200 [26] WPIX

DNC C1986-070823

TI **N-vinyl formamide** polymer production - by reacting formaldehyde with **acetaldehyde** using basic catalyst, reacting prod. with alcohol heating in gaseous phase and polymerising.

DC A14 A91 F09

PA (MITU) MITSUBISHI CHEM IND LTD

CYC 1

PI JP 61097309 A 19860515 (198626)* 3

ADT JP 61097309 A JP 1984-219301 19841018

PRAI JP 1984-219301 19841018

IC C08F026-02

AB JP 61097309 A UPAB: 19930922

Method comprises reacting **formamide** with **acetaldehyde** in the presence of basic catalyst, reacting the obtd. N-alpha-hydroxyethyl) **formamide** with prim. or sec. alcohol in the presence of acid catalyst, heating the obtd. N-(alpha-alkoxyethyl) **formamide** to 250-600 deg.C in gaseous phase and polymerising the obtd. **N-vinylformamide** in the presence of radical initiator.

USE/ADVANTAGE - **N-vinylformamide** polymer of high quality is produced in high yield and is hydrolysed to obtain polyvinylamine useful as flocculant, paper-making agent or ion exchange resin.

0/0

FS CPI

FA AB

MC CPI: A01-D06; A04-D; A10-E09; F05-A06C

L111 ANSWER 14 OF 14 WPIX COPYRIGHT 2004 THE THOMSON CORP on STN

AN 1985-184991 [31] WPIX

DNC C1985-080753

TI Preparation of N-substd. **formamide** from **formamide** - and **acetaldehyde**, and of N-alpha-alkoxyethyl **formamide** by reaction with alcohol.

DC A41 E16

IN MURAO, Y; SATOH, K

PA (MITU) MITSUBISHI CHEM IND LTD

CYC 7

PI DE 3500773 A 19850725 (198531)* 27

GB 2152929 A 19850814 (198533)

FR 2558156 A 19850719 (198535)

AU 8537641 A 19850718 (198536)

JP 60149551 A 19850807 (198538)

JP 60193953 A 19851002 (198546)

US 4567300 A 19860128 (198607)

GB 2186876 A 19870826 (198734)

CA 1230347 A 19871215 (198802)

GB 2152929 B 19880622 (198825)

GB 2186876 B 19880622 (198825)

DE 3500773 C 19910411 (199115)

JP 04056823 B 19920909 (199240) 6 C07C233-18

JP 05010332 B 19930209 (199309) 6 C07C233-17

ADT DE 3500773 A DE 1985-3500773 19850111; GB 2152929 A GB 1985-669 19850111;

FR 2558156 A FR 1985-384 19850111; JP 60149551 A JP 1984-5232 19840114; JP

60193953 A JP 1984-47967 19840313; US 4567300 A US 1985-690252 19850110;

GB 2186876 A GB 1987-5867 19870512; JP 04056823 B JP 1984-47967 19840313;

JP 05010332 B JP 1984-5232 19840114

FDT JP 04056823 B Based on JP 60193953; JP 05010332 B Based on JP 60149551

PRAI JP 1984-5232 19840114; JP 1984-47967 19840313

IC ICM C07C233-17; C07C233-18
 ICS B01J027-18; B01J027-232; C07B061-00; C07C102-00; C07C103-38;
 C07C231-08; C07C231-22

AB DE 3500773 A UPAB: 19930925

An N-substd. **formamide** of formula (I) is prepared by (a) reacting **formamide** with **acetaldehyde** in presence of a basic catalyst, and opt. (b) reacting the N-(alpha-hydroxyethyl)-**formamide** (II) from stage (a) with a prim. or sec. alcohol in presence of an acid catalyst. R=H or a radical from a prim. or sec. alcohol.

USE/ADVANTAGE - Is partic. production of (II) and of N-(alpha-hydroxyethyl)-**formamides**, intermediates in preparation of N-vinyl**formamide** (III). (III) is a monomer for cationic polymers of the polyvinylamine series; these polymers are dehydrating agents for organic slurries, and agents for improving filterability or yield of fillers in the paper industry. An economically productive process is provided.

0/0

FS CPI

FA AB

MC CPI: A01-D06; E10-D03C; N01-A; N01-D; N04; N05-E

ABEQ DE 3500773 C UPAB: 19930925

An N-substd. **formamide** is produced having the formula CH₃CH(OR)(NHOCH) (where R is H or a radical of a prim. or sec. alcohol).

Formamide is reacted with **acetaldehyde** in the presence of a weakly basic salt of a strong base and a weak acid having a pK_a value of 4-15. If R is not H, the N-(alpha-hydroxyethyl)-**formamide** (I) so obt. is reacted with a prim. or sec. alcohol in the presence of an acid catalyst.

Pref. the reaction of **formamide** and **acetaldehyde** is performed at 0-40 deg.C. Pref. gaseous **acetaldehyde** is introduced into the soln. of **formamide** and the weakly basic salt. Pref. the salt is Na- or K- carbonate, phosphate or pyrophosphate.

USE/ADVANTAGE - An industrially useful process is provided for the prodn. of (I) and N-(alpha-alkoxy ethyl) **formamide**, as an intermediate starting material for N-vinyl **formamide**.

ABEQ GB 2152929 B UPAB: 19930925

A process for producing N-(alpha-hydroxyethyl) **formamide** represented by the formula (I) which comprises reacting **formamide** with **acetaldehyde** in the presence of a basic catalyst which is a salt comprising a strong base and a weak acid of a pK_a of 4-15 as measured at a concn. of 0.1 mol/l. in an aq. soln. thereof at 25 deg.C.

ABEQ GB 2186876 B UPAB: 19930925

A process for producing a N-substituted **formamide** represented by the formula (I): wherein R represents a primary or secondary alcohol which is less a hydroxy group and which thus has a free valency, which process comprises reacting **formamide** with **acetaldehyde** in the presence of a basic catalyst and reacting the thus obtained N(alpha-hydroxyethyl) **formamide** with a primary or secondary alcohol in the presence of an acid catalyst.

ABEQ US 4567300 A UPAB: 19930925

N-substd. **formamide** of formula (I) is produced, by reacting **formamide** with CH₃CHO and a basic catalyst, and opt. further reacting the N-(alpha-hydroxyethyl) **formamide** obt. with a prim. or sec. alcohol and an acid catalyst. R is H or the residual gp. of a prim. or sec. alcohol obt. by reacting N-(alpha-hydroxyethyl) **formamide** with the alcohol. Pref. (a) is performed at 0-40 deg.C, using a gaseous feed of CH₃CHO into **formamide** soln. and catalyst. When R is H, prepn. comprises reacting using a weakly basic salt catalyst of a strong base and weak acid of pK_a 4-15, e.g. hydroxide of Li, Na or K with organic carboxylic acid, phenol, H₂SO₃, etc.

USE - For prodn. of N-vinylformamide.

=> d his

(FILE 'HOME' ENTERED AT 06:02:47 ON 29 SEP 2004)
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 06:03:08 ON 29 SEP 2004
 L1 1 S US20040186319/PN OR (US2003-652104# OR WO2003-US27084 OR US20
 E BECKMAN E/AU
 L2 257 S E3,E6,E12-E18
 E CHAPMAN T/AU
 L3 69 S E3,E12,E47,E48
 E FAVERO C/AU
 L4 7 S E3,E5-E7
 E CAPELLI C/AU
 L5 27 S E3,E5,E6
 E SWIFT H/AU
 L6 185 S E3,E7,E12-E15

FILE 'REGISTRY' ENTERED AT 06:05:42 ON 29 SEP 2004
 L7 1 S 13162-05-5
 L8 523 S 13162-05-5/CRN
 L9 4 S L8 NOT (MXS OR IDS OR PMS)/CI
 L10 3 S L9 NOT CONJUGATE
 L11 4 S L7,L10

FILE 'HCAPLUS' ENTERED AT 06:07:11 ON 29 SEP 2004
 L12 189 S L11
 L13 778 S N() (VINYLFORMAMIDE OR ETHENYLFORMAMIDE OR (VINYL OR ETHENYL) ()
 L14 804 S L12,L13
 L15 5 S L2-L6 AND L14
 SEL RN L1

FILE 'REGISTRY' ENTERED AT 06:09:04 ON 29 SEP 2004
 L16 13 S E1-E13
 L17 12 S L16 NOT L11

FILE 'HCAPLUS' ENTERED AT 06:18:27 ON 29 SEP 2004
 L18 68 S HYDROXYETHYLFORMAMIDE OR (HYDROXYETHYL OR HYDROXY ETHYL) () FOR
 L19 5 S FORMYLAMINOETHANOL OR FORMYL() (AMINOETHANOL OR AMINO ETHANOL)

FILE 'REGISTRY' ENTERED AT 06:21:01 ON 29 SEP 2004
 L20 1 S 693-06-1
 L21 1 S 102904-85-8
 L22 2 S L20,L21
 SEL RN
 L23 8 S E14-E15/CRN
 L24 3 S (SUCCINIC ANHYDRIDE OR MALEIC ANHYDRIDE OR PHTHALIC ANHYDRIDE
 L25 3 S 9011-16-9 OR 145314-10-9 OR 9011-13-6
 L26 23203 S 108-31-6/CRN
 L27 381 S L26 AND 107-25-5/CRN
 L28 1 S L27 AND 124-18-5/CRN
 L29 380 S L27 NOT L28
 L30 5 S L29 AND 2/NC
 L31 375 S L29 NOT L30
 L32 88 S L31 AND SALT
 L33 79 S L32 AND 1/NR
 L34 169 S L31 AND 1/NR NOT L32
 L35 5554 S L26 AND 100-42-5/CRN
 L36 1869 S L35 AND 2/NR
 L37 29 S L36 AND 2/NC

L38 15 S L37 AND GRS/CI
 L39 14 S L37 NOT L38
 L40 301 S L36 AND SALT
 L41 1 S 75-07-0
 L42 1 S 75-12-7
 L43 1 S 7631-86-9
 L44 1 S TOLUENE/CN

FILE 'HCAPLUS' ENTERED AT 06:36:58 ON 29 SEP 2004

L45 112 S L22
 L46 14 S L14 AND L18,L19,L45
 L47 10 S L14 AND L24
 L48 3 S L14 AND L25,L28,L30,L39
 L49 2 S L14 AND CYCLIC(L)ANHYDRIDE
 E ANHYDRIDE/CT
 L50 0 S L14 AND E40
 L51 2 S L14 AND E37,E59-E67
 E E37+ALL
 L52 16 S L14 AND E2+NT
 L53 32 S L14 AND (L41 OR ACETALDEHYDE)
 L54 9 S L14 AND (L44 OR TOLUENE)
 L55 155 S L14 AND (L42 OR FORMAMIDE)
 L56 21 S L14 AND L43
 L57 30 S L55 AND L53,L54
 L58 12 S L46 AND L47-L49,L51-L54,L56,L57
 L59 14 S L46,L58
 L60 81 S L12 (L) PREP+NT/RL
 L61 81 S L11/P
 L62 472 S L14 (L) (PREP? OR SYNTHES? OR MANUFACT? OR PRODUC?)
 L63 11 S L60,L61 AND L59
 L64 45 S L60,L61 AND L46-L58
 L65 18 S L1,L15,L59,L63
 L66 11 S L64 AND L65
 L67 18 S L65,L66
 L68 69 S L64,L60,L61 NOT L67
 L69 18 S L68 AND VINYLFORMAMIDE/TI
 L70 51 S L68 NOT L69
 L71 17 S L70 AND (FLUIDIZED BED OR AMINE FUNCTIONAL OR CONTIN? DISTILL
 SEL DN AN 2 4 5 9 16
 L72 5 S L71 AND E1-E15
 SEL DN AN L69 11
 L73 1 S L69 AND E16-E18
 SEL DN AN L67 3 9 11 12 13 16 18
 L74 7 S L67 AND E19-E39
 L75 17 S L72-L74,L15
 L76 7 S L46 NOT L75
 L77 25 S L60,L61 AND L47-L54,L56-L59
 L78 11 S L77 NOT L75,L76
 L79 17 S L75 AND L1-L6,L12-L15,L18,L19,L45-L78
 SEL RN

FILE 'REGISTRY' ENTERED AT 07:14:57 ON 29 SEP 2004

L80 94 S E40-E133
 L81 10 S L80 AND L7-L11
 L82 13 S L80 AND L16,L17
 L83 11 S L80 AND L20-L44
 L84 4 S L81 NOT PMS/CI
 L85 2 S L81 AND 1/NC
 L86 3 S L84 NOT COMPD
 L87 4 S L85,L86
 L88 11 S L82 NOT S/ELS
 L89 9 S L83 NOT C3H5NO
 L90 71 S L80 NOT L81-L83

L91 15 S L87,L88,L89

FILE 'HCAPLUS' ENTERED AT 07:19:22 ON 29 SEP 2004

L92 16 S L91 AND L79
L93 1 S L79 NOT L92

FILE 'HCAPLUS' ENTERED AT 07:20:00 ON 29 SEP 2004

FILE 'WPIX' ENTERED AT 07:20:19 ON 29 SEP 2004

L94 1 S L1
L95 473 S L13/BIX
E R08072/DCN
E E3+ALL
L96 71 S E1
E R08072/DCN
L97 71 S E3-E12
L98 493 S L95-L97
L99 29 S L18/BIX OR L19/BIX
E R03674+ALL/DCN
L100 3 S E1
L101 15 S L98 AND L99,L100
E R00842+ALL/DCN
L102 5 S L98 AND (E1 OR 0842/DRN OR SUCCINIC ANHYDRIDE/BIX)
E R00843+AL/DCN
E R00843+ALL/DCN
L103 44 S L98 AND (E1 OR 0843/DRN OR MALEIC ANHYDRIDE/BIX)
E R00517+ALL/DCN
L104 4 S L98 AND (E1 OR 0517/DRN OR PHTHALIC ANHYDRIDE/BIX)
E R01694+ALL/DCN
L105 1 S L101 AND L102-L104
L106 60 S L101-L104 NOT L94,L105
SEL DN AN L106 43 45 46 47 48 49 50 52 53 56 57 58 59
L107 13 S L106 AND E1-E26
L108 14 S L94,L105,L107
L109 14 S L108 AND ?FORMAMID?/BIX
L110 9 S L109 AND (TOLUENE OR ACETALDEHYD? OR ANHYDRID?)/BIX
L111 14 S L108-L110

FILE 'WPIX' ENTERED AT 07:33:35 ON 29 SEP 2004

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